

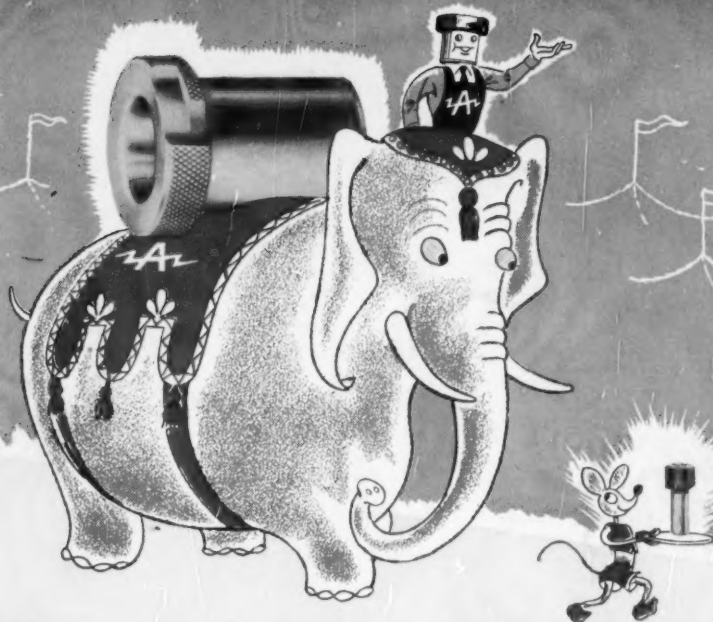
modern machine shop

PRODUCING
TURBOCHARGERS
See Page 104

SWINDING
CLAMPS
See Page 112

PLANT LAYOUT
See Page 140

JUNE
1956



THERE'S NO LARGER RANGE OF STANDARD
BUSHING SIZES THAN *American's!*



GET THE CATALOGS THAT TAKE
THE HEADACHE OUT OF ORDER-
ING DRILL JIG BUSHINGS — THE
ORIGINAL 3-D METHOD OF
ORDERING . . . WRITE NOW FOR
YOUR FREE COPIES.

... AMERICAN HAS ALWAYS HAD
A WIDER RANGE OF A. S. A. AND AMERICAN
STANDARDS IMMEDIATELY AVAILABLE TO YOU.
... others have copied but never equalled our
KING SIZE selection! . . . for high speed delivery of pre-
cision drill jig bushings — smallest to the largest, or specials to your order,
specify American. There's an exclusive American Distributor near you.


American DRILL BUSHING CO.
5107 PACIFIC BOULEVARD LOS ANGELES 58, CALIFORNIA

FROM THE SMALLEST TO THE LARGEST, THE RIGHT DRILL BUSHING IS AN AMERICAN DRILL BUSHING

Decision at **SPS**

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA.

Standard Pressed Steel Company of Jenkintown, Pennsylvania is the world's largest manufacturer of Socket Screw Products, Cap Screws, Set Screws and a variety of other threaded fasteners. These SPS products are used on aircraft, home appliances, business machines, in fact, wherever products or components must be held together. A continuing program of research and development at SPS assures a lasting place for the Company in America's future.



A moment of decision . . . after months of trial, weeks of conference . . .

It's ADAMAS . . . again . . . and it's no surprise that Adamas tungsten carbide is specified at SPS . . . for Adamas tungsten carbide products are subject to the world's most rigid set of quality control procedures.

Careful selection of materials lies at the heart of quality control at SPS. And, at SPS, where carbide is called upon for use in a great variety of applications, Adamas tungsten carbide is a logical choice . . . for there's an Adamas carbide grade for every job.

**ADAMAS CARBIDE CORPORATION
KENILWORTH, NEW JERSEY**



JUNE

1956

Vol. 29

No. 1

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modern machine shop

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Member

BPA



NBP

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(For more information on cover advertisements, use Reader Service Cards
opposite pages 32 and 340.)

3/8" Machine

threads 500 pieces per hour...

... with 4,500 pieces threaded between chaser grinds—25% more production and 80% longer tool life than by best previous methods. #10 24-P UN threads are cut 1 3/4" long on 54" galvanized wire rods at Mid-West Wire Products, Detroit, Mich. For more information on this small high-speed machine for threading 3/16" to 1/2" in diameter, ask for bulletin H-91.



LANDIS *Machine* COMPANY

398 WAYNESBORO • PENNSYLVANIA • U. S. A.

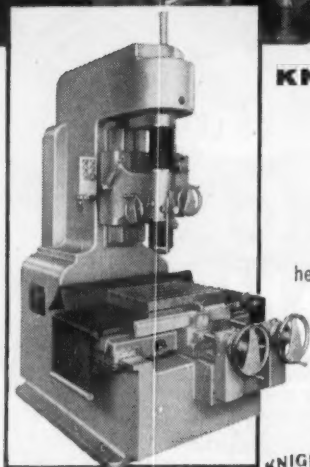
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Believe It Or Not

**17-HOLE JIG FINISHED
IN ONLY 55 MINUTES!**



Table Size.....18" x 24"
Table Travel
Longitudinal.....20" Cross.....15"
Vertical Capacity.....23"
Throat.....20"
Weight.....7500 Lbs.



KNIGHT'S

Jigmaster

Starting from the solid, time includes all locating, tool changing, spindle speed changes, drilling, reaming and boring. Reamed and bored holes were held to $\pm .0002$ " on size; $\pm .0005$ " on location. Completing holes in this $\frac{3}{4}$ " jig plate required 56 tool changes, 43 spindle speed changes, 23 table settings. Holes were center drilled, drilled one or more times, either reamed or bored. Bored holes finished to size with preset bars; $\frac{1}{4}$ " center hole finished with offset head making 4 cuts. This record time could only have been done with the Jigmaster's quick tool change and fast table setting features.

*Accuracy to .0001" available with gauge blocks.

Write For Catalog



W. B. KNIGHT MACHINERY COMPANY

3922 West Pine Boulevard

St. Louis 8, Missouri

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June, 1956

modern machine shop 3

WILLIAMS LOCKING ADJUSTABLE WRENCH

THE VERSATILE FAVORITE OF SKILLED MECHANICS!

WITH EXCLUSIVE PATENTED FEATURES

- NO OBSTRUCTIONS
- POSITIVE LOCK
- ONE HAND OPERATION
- STRUCTURALLY SOUND
- RAPID ADJUSTMENT
- NO FUMBLING
- DROP-FORGED FROM SELECTED ALLOY STEEL AND CHROME PLATED
- INCREASED SAFETY

AVAILABLE THROUGH YOUR
LOCAL DISTRIBUTOR.

COSTS NO MORE!

Why accept less when
you can get the best?
This is the precision-
made locking adjustable
which made all other
adjustable wrenches out-
dated. All the features
you want at:—

\$2.08 ea. for 6"
with $\frac{3}{4}$ " capacity

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with $\frac{13}{16}$ " capacity

\$3.10 ea. for 10"
with 1 $\frac{1}{16}$ " capacity

\$4.30 ea. for 12"
with 1 $\frac{3}{16}$ " capacity



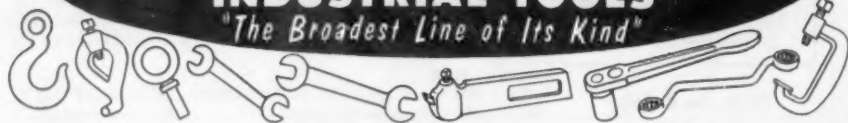
Remember your local distributor gives you the fastest service at lowest cost.

J. H. WILLIAMS & CO., • 410 VULCAN ST., BUFFALO 7, N. Y.

WILLIAMS

INDUSTRIAL TOOLS

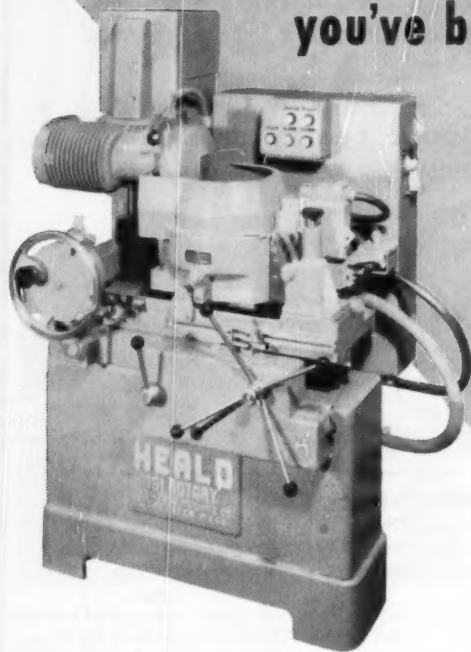
"The Broadest Line of Its Kind"



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THIS IS IT

the small rotary surface grinder
you've been waiting for!



- Manual or Power Reciprocation
- Simple Mechanical Operation
- Grinds Flat, Convex or Concave
- Extremely Low Microinch Finish
- 6" Magnetic Chuck
- Column-Type Construction
- Adequate Power to Wheelhead
- "Right Hand" Operation

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for complete
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HEALD MODEL 161 Rotary Surface Grinder designed
for maximum precision and economy on small work.

THE HEALD MACHINE COMPANY

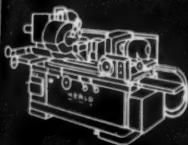
Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



ALSO A COMPLETE LINE OF



Bore-Matics and Internal Grinders

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

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NAME _____

COMPANY _____

ADDRESS _____

It Pays 6 WAYS to Specify Armco Stainless Bar and Wire

1. Wide selection . . . more than 50 standard and special Armco Stainless Steel grades.
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Just phone the nearest Armco Sales Office to give your order. If you need 8-hour delivery, call the Armco Distributor near you. Check the coupon and mail it to us if you don't know his name.

ARMCO STEEL CORPORATION

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Send me the name of the Armco Stainless Bar and Wire Distributor near me.

Can you help us get delivery of these stainless bar and wire items?

Grade

Shape

Size

Finish

Name

Firm

Street

City Zone State

ARMCO STEEL CORPORATION

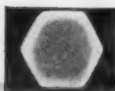
1546 CURTIS STREET, MIDDLETOWN, OHIO



Sheffield Steel Division • Armco Drainage & Metal Products, Inc. • The Armco International Corporation

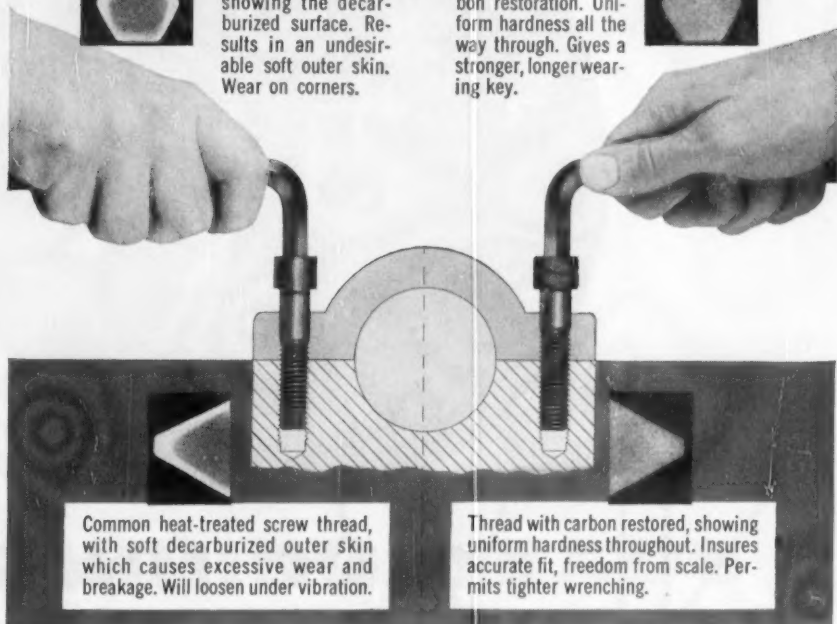
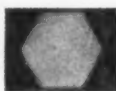
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How carbon affects fastener performance



Common hexagon socket key stock, showing the decarburized surface. Results in an undesirable soft outer skin. Wear on corners.

CHICAGO hexagon socket key--after carbon restoration. Uniform hardness all the way through. Gives a stronger, longer wearing key.



Common heat-treated screw thread, with soft decarburized outer skin which causes excessive wear and breakage. Will loosen under vibration.

Thread with carbon restored, showing uniform hardness throughout. Insures accurate fit, freedom from scale. Permits tighter wrenching.

Screw fasteners may look identical, but the microscope reveals wide differences in their ability to "take it".

Steel hardness depends on the precise amount of carbon in its structure. But during steel manufacture this vital surface carbon is inevitably lost. Result (shown above) is a soft, decarburized outer skin in the finished fastener, causing thread stripping, fatigue failure, excessive wear, or loosening under vibration.

The soft "decarb" layer is eliminated

by The Chicago Screw Company's unique "Carbon Restoration" process in which surface carbon is replaced during heat treating. The process is precisely controlled to give uniform hardness from core to surface.

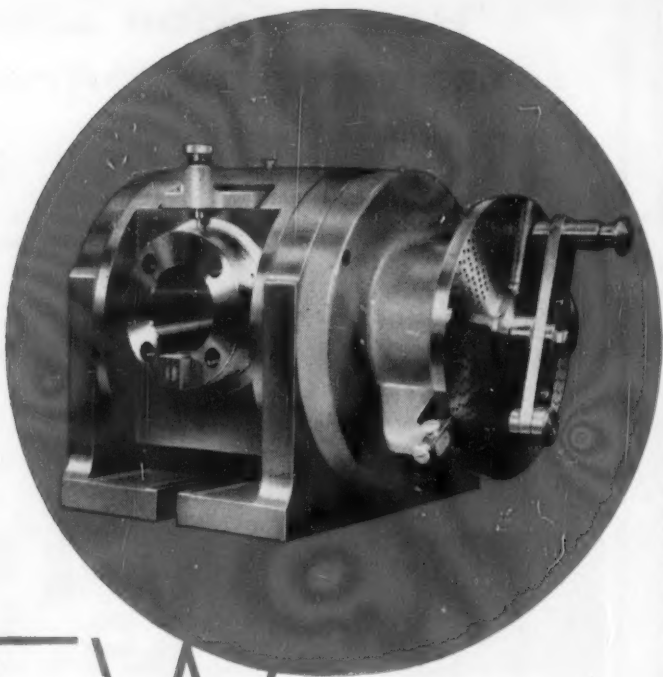
All Chicago "Safety-Plus" Socket Screw Products and heat-treated cap screws have the benefit of *Carbon Restoration* plus complete quality control from start to finish. For full information and catalog, write our Standard Products Division.

THE CHICAGO SCREW COMPANY

DIVISION OF STANDARD SCREW COMPANY • ESTABLISHED 1872

2803 WASHINGTON BOULEVARD, BELLWOOD, ILLINOIS

For more data circle 206 on Reader Service Card



NEW CINCINNATI

10" 12" 14" SWING

Design Highlights



CINCIN

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING

Ruggedness and a high degree of accuracy are skillfully combined in the new CINCINNATI Dividing Heads. They're as much at home in a heavy helical milling setup as the light duty setups ordinarily associated with high precision equipment . . . they're handy to have around for many types of inspection jobs. And here's another advantage . . . it will not be necessary for you to change a single engineering drawing or methods procedure. The index plate and sector on the new CINCINNATI Dividing Heads are the same as before, and the worm and wheel ratio remains at 40 to 1. Would you like to know more about the new CINCINNATI 10" 12" and 14" Dividing Heads? Write for publication No. M-1924.

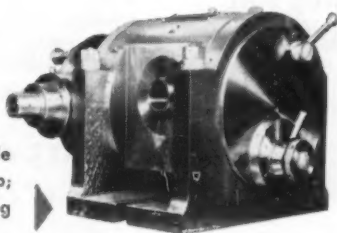
**THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO**

DIVIDING HEADS

PRECISION BALL BEARING SPINDLE
NO. 50 SERIES SPINDLE TAPER
MILLING MACHINE TYPE SPINDLE NOSE
ANGULAR VERTICAL SWIVEL
360° PERIPHERAL CLAMPING
DIRECT INDEXING ON SPINDLE NOSE
COMPLETELY ENCLOSED HEADSTOCK

NATI

Rear view. Spindle clamping lever, top; worm disengaging lever, below.

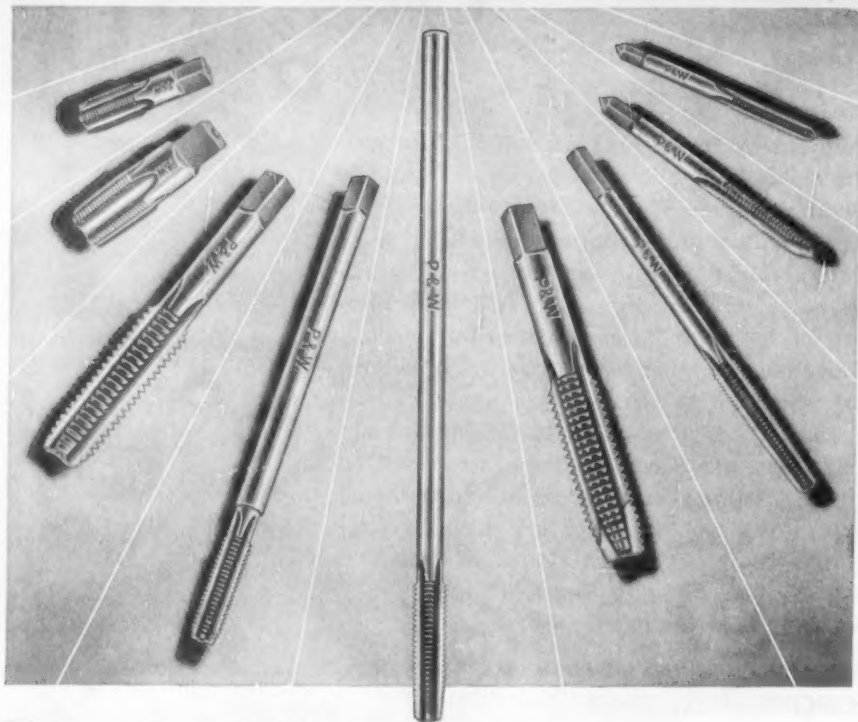


MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

For more data circle 208 on Reader Service Card

June, 1956

modern machine shop 9



PRATT & WHITNEY

Quality TAPS

**for the
long run ...
because
they run
longer!**

When buying taps, it's not the purchase price that's most important. It's what you get for your money . . . the number of clean, accurate threaded holes each tap delivers on the production line! Correctly designed, carefully manufactured and rigidly inspected, *every* Pratt & Whitney Tap you buy has the same high quality. There is a complete line for all your needs . . . available from on-the-shelf stock at Pratt & Whitney Branches everywhere.

Write now for P&W Ground Thread Tap Circular No. T-583 and Cut Thread Tap Circular No. 541.



PRATT & WHITNEY COMPANY
INCORPORATED

22 Charter Oak Boulevard, West Hartford, Conn.
Branch Offices and Stock in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

25 Charter Oak Boulevard, West Hartford, Conn.

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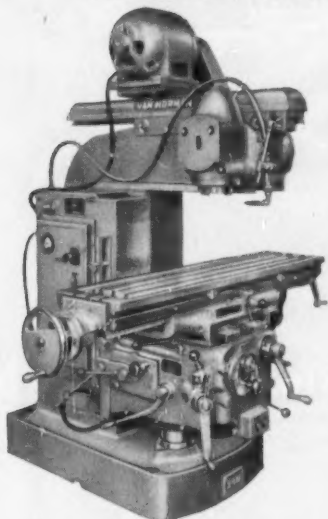
Here's a Profitable Equation:

1 Van Norman Ram Type Miller =

2 Single Purpose Machines

RESULT

LESS Capital Investment
MORE Machine Productivity



The Adjustable Cutterhead eliminates the need of two single purpose machines . . . permits horizontal, vertical and angular milling without attachments.



WHICH WOULD YOU RATHER HAVE?

1 Van Norman Ram Type Miller



1 Operator



1 Machine



1 Complete Setup

OR

2 Single Purpose Machines



2 Operators



2 Machines



2 Complete Setups

You can own a Van Norman Ram Type Milling Machine for as little as \$.81 per day per \$1000. investment.

Write for catalog and purchase plans giving complete details on all Van Norman Ram Type Millers.

Don't wait . . . for extra profits install a Van Norman now! They are

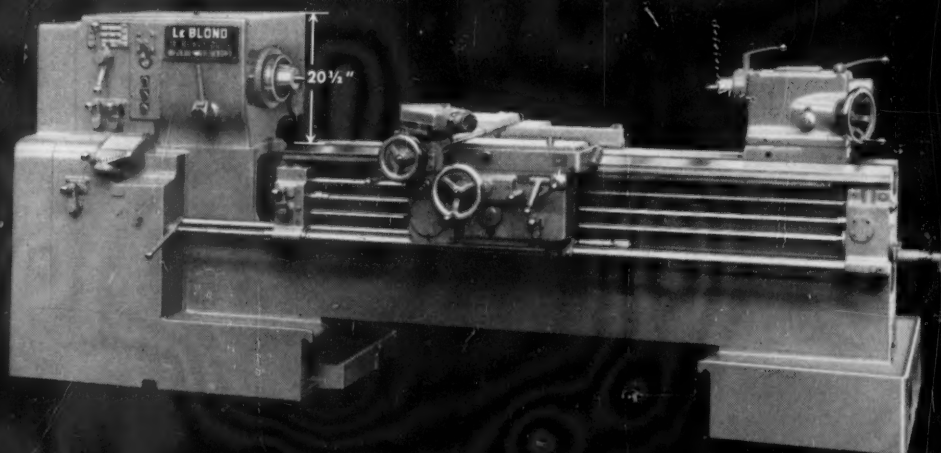
available on many purchase plans—Outright sale . . . Purchase on conditional sales contract up to 5 years . . . Pay as you depreciate . . . See your dealer or write Van Norman Company.

Conditional Sales Contracts not available to Export.

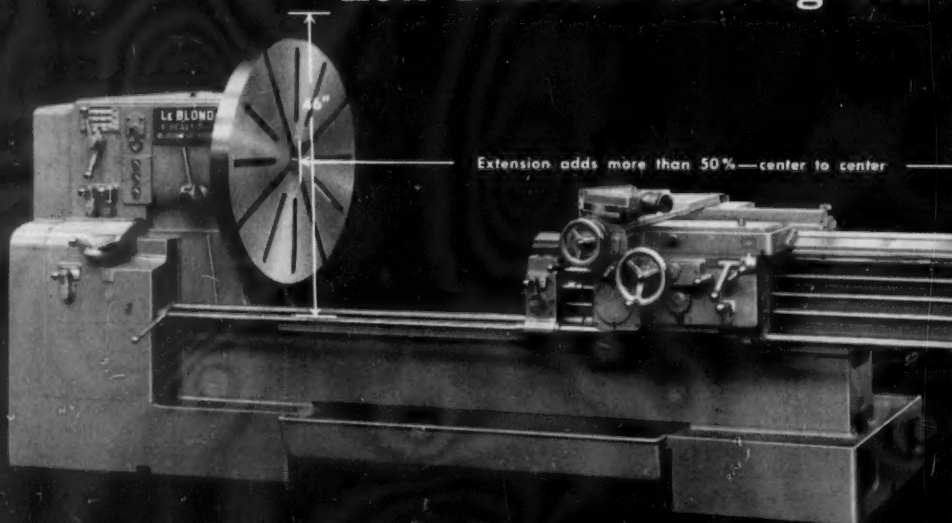
VAN NORMAN MACHINE CO., Springfield 7, Mass.
 Manufacturers of: Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

For more data circle 210 on Reader Service Card

the lathe that gives versatile a new



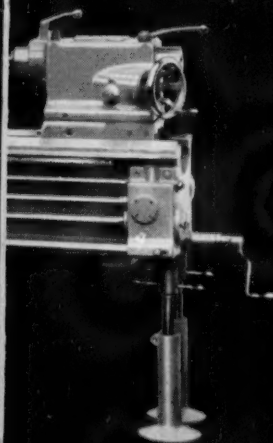
new LeBlond sliding bed



Extension adds more than 50%—center to center

meaning!

gap lathe



Here's a lathe that is fundamentally different. It has a special bed that *slides* open to form a gap—gives you approximately *twice* the normal swing size. Sliding the bed also gives greater bed length, more than 50% greater distance between centers. And, with bed closed it functions as a regular engine lathe.

So, what we mean by a *versatile* lathe is one that actually changes shape to suit your odd-shaped parts. It handles all the usual work, plus a wide variety of large diameter jobs, extra long parts, and combinations of the two. "Swing size" as such is no longer a limitation. For example, here are some of the unusual capacities you can handle on the 16" LeBlond Sliding Bed Gap Lathe:

Face 38" diameters in one cut

Face 45" diameters in two cuts

Turn lengths more than 50% greater than normal center distance

With extension rest (optional): turn 27½" diameter, 13¼" length

With Full-Swing turning attachment (optional):

turn 45" diameter almost full length of gap

Other important features of the new LeBlond 16"/38" SBG Lathe include new spindle bearing design for high-speed turning, combination gear-belt drive headstock, 18 geared speeds, 9 timing belt-driven speeds from 8 to 2000 rpm, spur gear design, four-way rapid traverse, one-piece apron, totally enclosed quick change box, hardened and ground steel bedways, thrust-lock tailstock.

If you have a variety of parts to turn—particularly the unpredictable extremes you encounter in maintenance and job shop work—the LeBlond SBG may well be the answer. An economical answer, too! SBG's come in 4 sizes: 16"/38", 25"/50", 32"/60" Heavy Duties and the 17"/28" Regal. Like all LeBlonds they are built in every engineering detail to give you long dependable service.

Whatever your turning needs, there's a lathe in LeBlond's complete line to do the job. 76 different models to choose from. Call your LeBlond Distributor or write today.

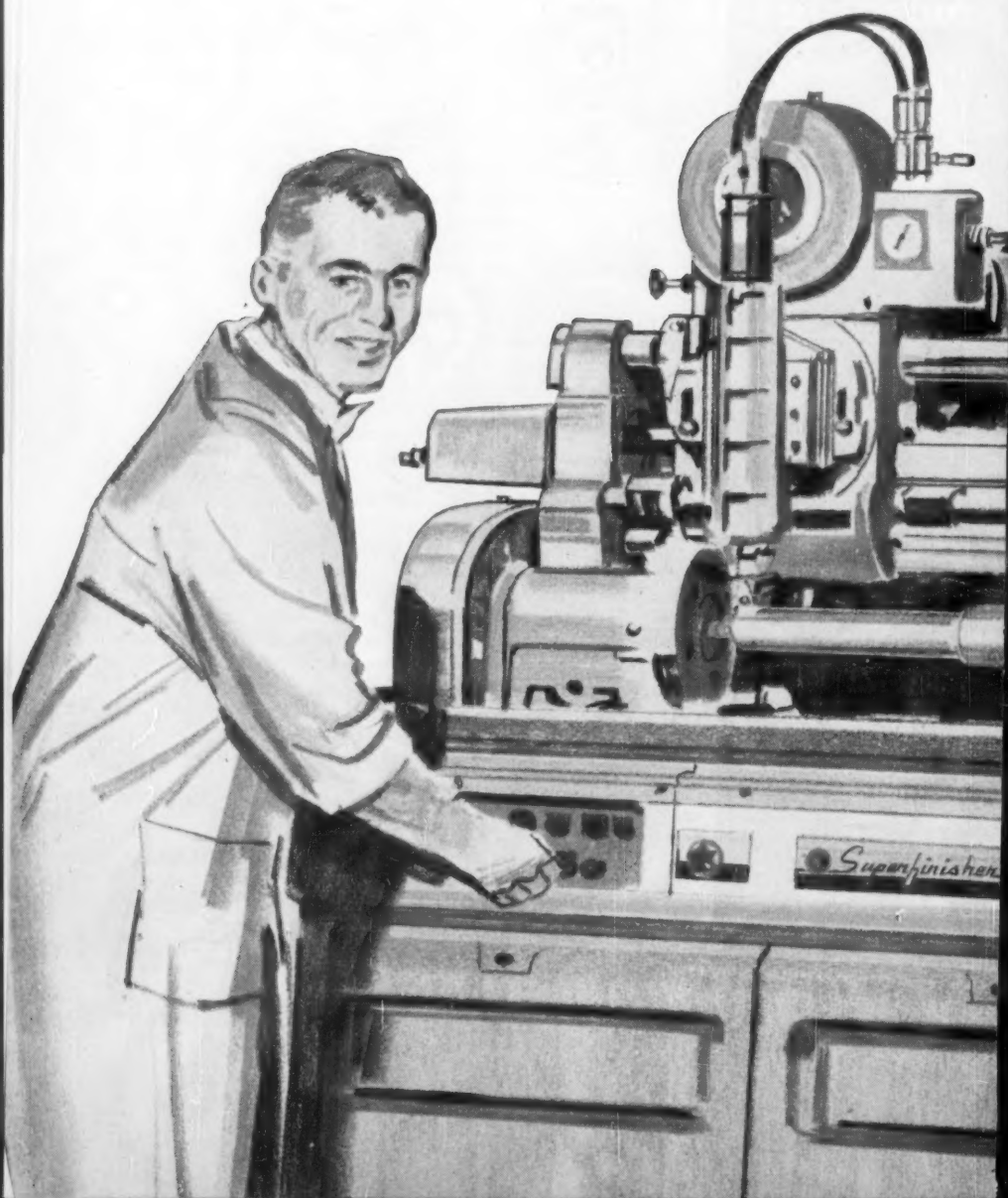
... cut with confidence



THE R. K. LEBLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

*World's largest builder of a complete line of lathes
for more than 69 years*

GISHOLT MASTERLINE
52A SUPERFINISHER

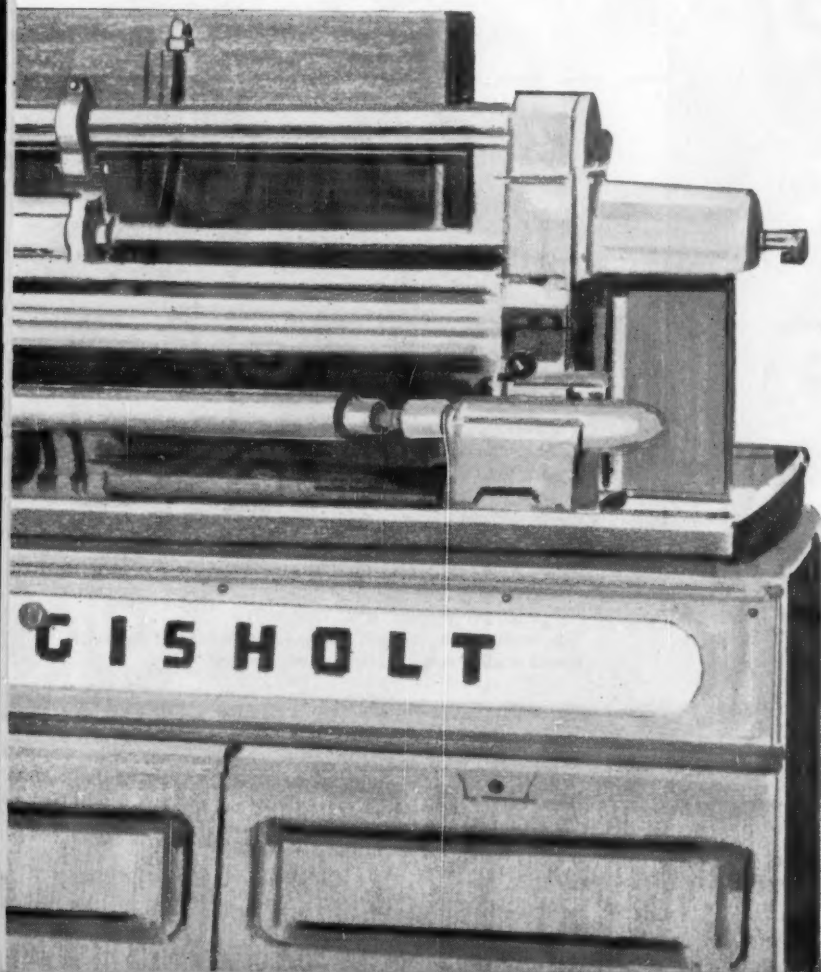


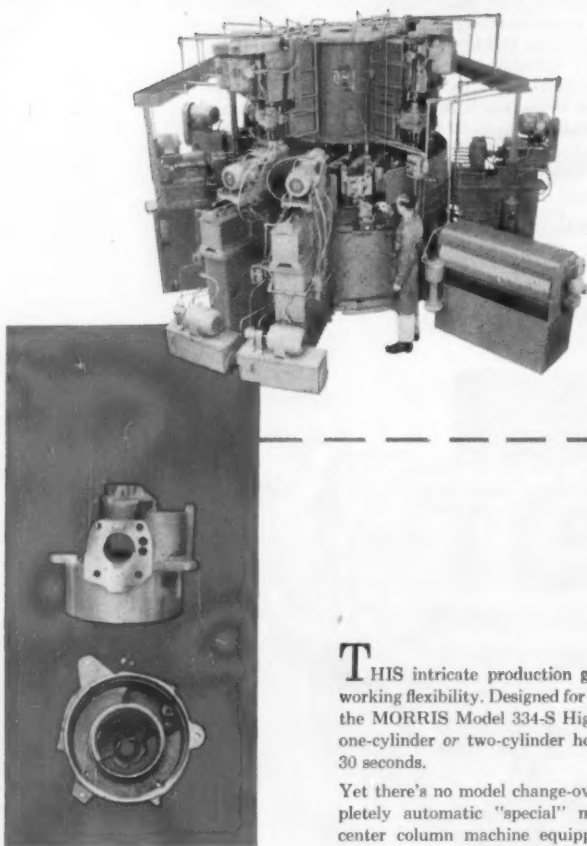


The Superfinishing process is recognized as one of the most important contributions to modern metalworking. Now—in this new 52A MASTERLINE Superfinisher—Gisholt offers an outstanding machine for either small job-lot work or high production runs. Other general purpose and high production models complete the line. Let us give you the complete facts on how Superfinishing may be profitably applied to your manufacturing processes—plus full details on the complete line of Gisholt Superfinishing Machines.

Gisholt Machine Company, Madison 10, Wisconsin

Look ahead—keep ahead—with Gisholt





18
STATIONS

47
OPERATIONS

120
PARTS/HOUR

THIS intricate production giant is also a triumph in metal-working flexibility. Designed for a leading appliance manufacturer, the MORRIS Model 334-S High Production Machine processes one-cylinder or two-cylinder housings at the rate of one every 30 seconds.

Yet there's no model change-over problem! The MORRIS completely automatic "special" machine uses a MORRIS basic center column machine equipped with an 84" dia. table, an 18-station automatic hydraulic index, and MORRIS Unit-Type Machine Tools.

A total of 47 spindles, mounted on three 8-inch way type units, six No. 2 CAM-MATIC Drill Units and eight AIR-OIL-MATIC Drill Units, are used to mill, drill, counterbore, spot face, bore, ream and tap housings.

The result . . . a "special" machine at a fraction of the usual special machine cost . . . accurate, flexible, fast!

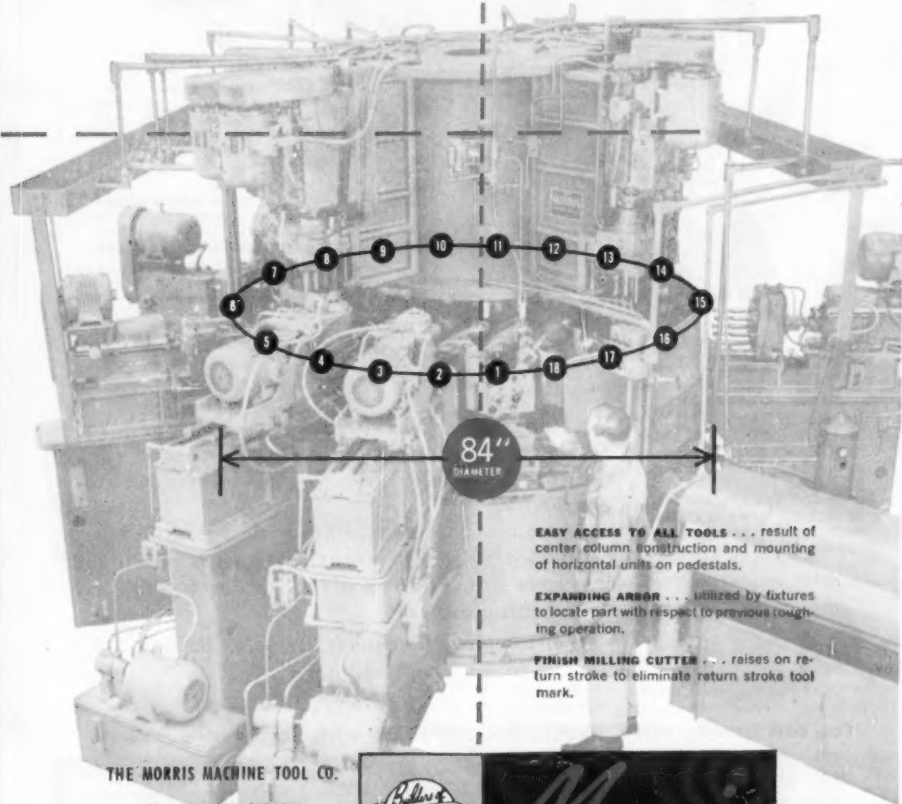
Investigate the production-boosting and cost-saving advantages of MORRIS Unit-Type High Production Machine Tools.

WRITE TODAY for detailed literature, or outline your production problem for analysis by MORRIS engineers.

- 1.....LOAD 1 PART
- 2M.....MILL 1 SURFACE
- 3M.....FINISH MILL 1 SURFACE
- 4V.....DRILL AND BURR 1 HOLE
DRILL AND COUNTERBORE 4 HOLES
- 5H.....DRILL 4 HOLES
- Y.....DRILL AND BURR 1 HOLE
DRILL 2 HOLES
- 6V.....BURR 2 HOLES
REAM 1 HOLE
- 7M.....SPOT FACE 3 PLACES
- V.....DRILL AND BURR 1 HOLE
DRILL 1 HOLE
MILL .250 RADIUS
- 8V.....REAM 1 HOLE BURR 1 HOLE
BURR .250 MILLED RADIUS
- 9A.....MILL 1 SURFACE
- H.....DRILL AND BURR 4 HOLES
REAM 1 HOLE

- 10.....The angular operation at Station 9
utilizes those two stations as well.
- 11.....TAP 1 HOLE
- A.....DRILL FOR REAMING
- 11V.....ROUGH BORE CYLINDER DIAMETER
- 14V.....SEMI-FINISH BORE AND CHAMFER
CYLINDER DIAMETER
- 15H.....TAP 4 HOLES
- V.....FINISH BORE CYLINDER DIAMETER
- 16V.....CHAMFER BOTTOM OF BORE
WITH RECESSING TOOL
- 17V.....TAP 5 HOLES
- 18.....Station 18 is reserved for additional
operations for future part changes.

Operations: H—Horizontal
V—Vertical
A—Angular



EASY ACCESS TO ALL TOOLS . . . result of center column construction and mounting of horizontal units on pedestals.

EXPANDING ARBOR . . . utilized by fixtures to locate part with respect to previous roughing operation.

FINISH MILLING CUTTER . . . raises on return stroke to eliminate return stroke tool mark.

THE MORRIS MACHINE TOOL CO.
934 HARRIET STREET
CINCINNATI 3, OHIO

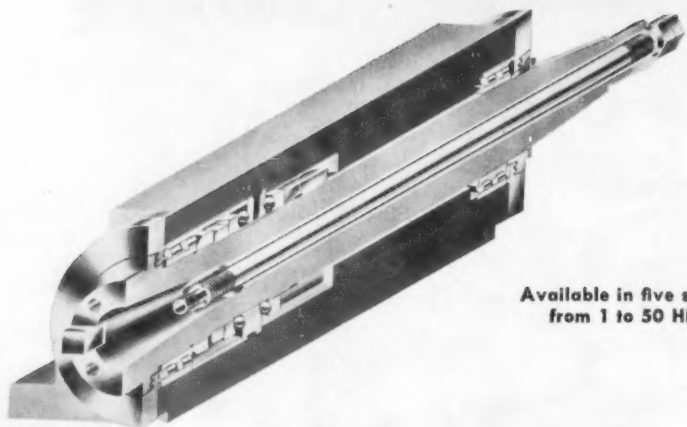


Morris

For more data circle 216 on Reader Service Card

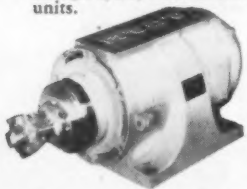
Your **BEST PACKAGED BUY** in milling spindles

POPE HEAVY DUTY PRECISION SPINDLES



Available in five sizes
from 1 to 50 HP

POPE HEAVY DUTY
MOTORIZED MILLING
MACHINE SPINDLES are
available in P-2500 Series,
from 1 to 100 HP, totally-
enclosed, fan cooled; also
in high cycle, water cooled
units.



P-12000 Series *Belt Driven* in sizes from 1 to 50 HP, with Standard milling machine tapers in the nose from #10 to #60. *Operable in any position you specify.*

See: the big shaft, the heavy duty double row cylindrical roller bearings and thrust bearings that have extra ability and the rigidity to support your cutting tools.

For complete dimensions, write for Bulletin S-8.

You can specify **POPE PRECISION SPINDLES** with Confidence No. 110

Specify

POPE

PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

For more data circle 217 on Reader Service Card

Efficiency in Cutting-off is Important

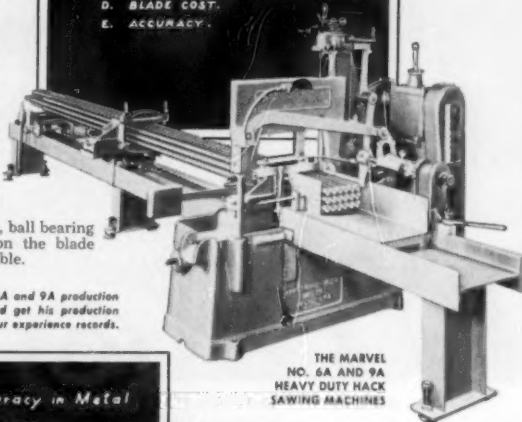
Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.

- A. Are all-ball-bearing and provide a quick return; therefore they run **FASTER** than others on the same work.
- B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.
- C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.
- D. Use a non-breakable high speed hack-saw blade—the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.
- E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Efficiency of cutting-off operation is measured by:

- A. MACHINE SPEED.
- B. FEED PRESSURE.
- C. LABOR TIME.
- D. BLADE COST.
- E. ACCURACY.



THE MARVEL
NO. 6A AND 9A
HEAVY DUTY HACK
SAWING MACHINES

Formula for Accuracy in Metal Sawing:

$$ACCURACY = \left(\frac{\text{Length}}{\text{Straightness} \times \text{Squareness}} \right)$$

$$\left(\frac{\text{Straightness}}{\text{Squareness}} \right) = \left(\frac{\text{Blade Rigidity}}{\text{Blade Tautness}} \right)$$



The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts any machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable**. These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.

Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws.

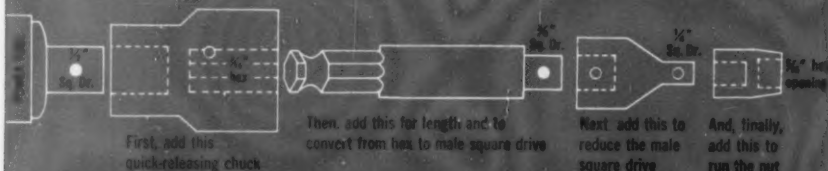


ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

For more data circle 218 on Reader Service Card

are you running nuts and cap screws the hard way?

like this?



then switch to APEX... the easy way!

like this!



Add **ONLY** this for length and to reduce the male square drive

And this to run the nut

Apex extensions are stocked in any combination of sizes, Female Square to Male Square, or Male Hex Drive to Male Square.

The easiest, most efficient and least expensive way to run nuts on production or maintenance work is with Apex nut running tools, designed and built to meet your requirements.

When you need extra length, for example, Apex stocks a full line of extensions to fit your tool anvils and accessories, regardless of the combination of types and sizes. Apex extensions bring power closer to the work, eliminate unnecessary tooling and extra connections that cause backlash

and loss of power. Available in short and standard lengths, and in long lengths in increments of one inch. $\frac{3}{4}$ ", 1", 1½" and 2½" square drive extensions are offered with ball lock or cross pin hole; other sizes and types are available with ball lock or pin lock.

Extensions are just one part of the complete Apex line of nut running tools, all of which are fully described in Catalog 29-R. Write, on your company letterhead please, for your copy.

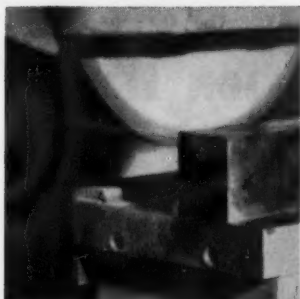


for the answer to your fastening problem!

THE APEX MACHINE & TOOL COMPANY

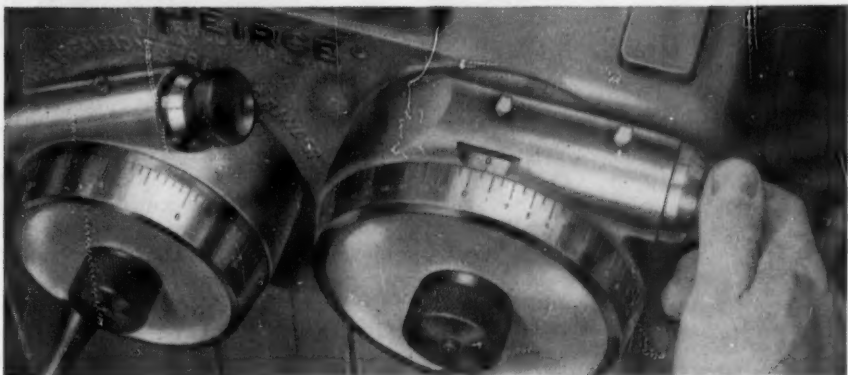
1027 S. Patterson Blvd. • Dayton 2, Ohio

For more data circle 219 on Reader Service Card

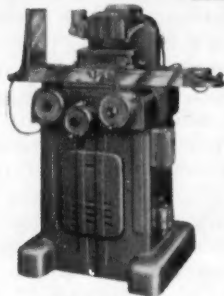


SPARK TEST

**Shows how a Taft-Peirce
No. 1 Surface Grinder
Repeats to .00005"**



Here is a surface grinder so accurate that few people would believe it until this simple demonstration was devised.

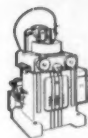


Take a side wheel grinding setup. Grind to a zero reading on the cross feed dial. Move the work away one or two thousandths with the cross feed vernier, then back to its original position. **NOTE: There's no grinding spark. Now, feed in $\frac{1}{2}$ of a tenth with the vernier and SEE THE GRINDING SPARK.**

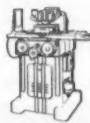
To our knowledge there's never been a standard grinder built before that even comes close to the accuracy of a T-P No. 1 Surface Grinder. An experienced operator frequently can grind to less than .00005" . . . with surfaces so smooth, in many cases, they seal without lapping.

Table, saddle, and column travel on anti-friction bearings retained in vees of hardened and ground alloy steel. Tilting wheelhead simplifies setups. Vernier fine-feed attachments, graduated in .0001" increments spaced $\frac{1}{2}$ " apart, are available for either the horizontal or vertical feed.

Compact, yet heavier than other machines, the No. 1 Surface Grinder maintains its accuracy over many years of rugged service. For more information, write for bulletin.



Rotary Surface Grinders



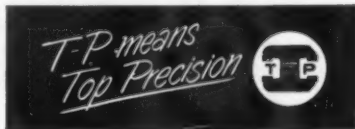
Precision Surface Grinders



Lapping Machines



Back Spot Peeling Machines



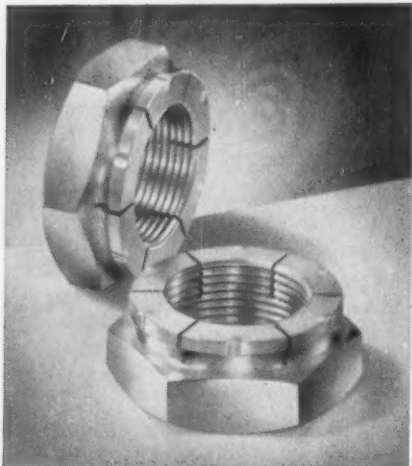
THE TAFT-PEIRCE MANUFACTURING COMPANY • WOONSOCKET, RHODE ISLAND

For more data circle 220 on Reader Service Card

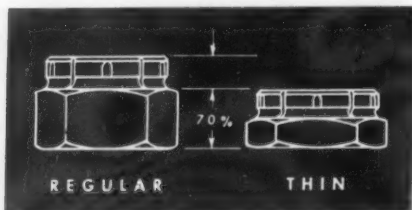
June, 1956

modern machine shop 21

Flexloc thin nuts save space, weight and production time



Standard FLEXLOC self-locking thin nuts are available in plain or cadmium plated alloy steel, for use in temperatures to 550°F; in plain or silver plated corrosion resisting steel, for temperatures to 750°F; and in brass and aluminum, for temperatures to 250°F. Standard sizes range from 6-32 to 1-8 NC-USS, from 6-40 to 1½-12 NF-SAE.



FLEXLOC thin nuts are 30% lower than regular height locknuts. There is a corresponding saving in weight. In sizes through ¾ in., thin FLEXLOCs meet tensile strength requirements for regular height locknuts. FLEXLOC nuts can be made in the thin type because every thread, even those in the locking section, carries its full share of the load. There are no nonmetallic inserts to waste head space or weaken the structure of the nut.

For more data circle 221 on Reader Service Card

Self-locking nuts are 30% lower and lighter; speed up assembly with hand or power tools

Self-locking FLEXLOC thin nuts are 30% lower than regular height locknuts of the same nominal diameter. They fit into spaces where regular height locknuts will not go. You can design lighter, more compact units with them.

Where you must reduce weight in a completed assembly, you can save by using shorter bolts with these lighter nuts. And you save production time. The length of engagement of mating threads is shorter: fewer revolutions of hand wrenches or power nut runners are needed to seat them.

FLEXLOC nuts are of 1-piece, all-metal construction. You can use a FLEXLOC fully seated as a locknut or at any point along a bolt as a stop nut. Once the threads in the resilient locking section are fully engaged, the FLEXLOC grips the mating threads with uniform locking torque wherever wrenching stops. Since there are no nonmetallic inserts to come out or deteriorate, the locking life of a FLEXLOC is virtually unlimited.

Your authorized industrial distributor stocks FLEXLOC nuts in a variety of sizes, materials and finishes. Consult him for details. Or write us for information about your special locknut problem. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

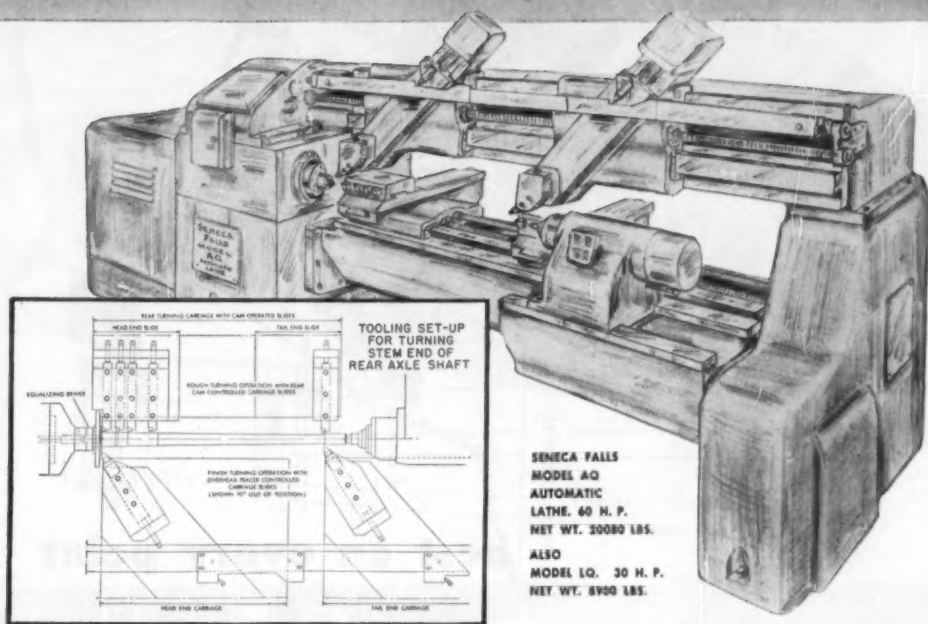
FLEXLOC LOCKNUT DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

A BETTER METHOD OF MACHINING REAR AXLE, AND OTHER SHAFTS



SENECA FALLS
MODEL AQ
AUTOMATIC
LATHE. 60 H. P.
NET WT. 30080 LBS.

ALSO
MODEL LQ. 30 H. P.
NET WT. 8700 LBS.

● The new Models LQ and AQ Seneca Falls Automatic Lathes are designed to combine the best and fastest methods of rough and finish turning shafts on a single machine without removing the work and without attention on the operator's part.

The roughing operation is accomplished with multiple tools on a rear carriage while finish turning is done with single, tracer-controlled tools on each of the two overarm carriages. Thus the advantages of multiple tooling for stock removal and single tool tracer turning for accurate finish operations are combined. By this method extremely close tolerances are maintained since the pressure of the single tool is constant over the entire length of the work piece, and full advantage can be taken of the higher cutting speeds now possible with the newer carbide and oxide tool materials.

The machining operation is completely automatic...the operator loads shafts between centers and pushes the starting button; multiple tools rough turn; tracer tools then finish turn; and finally the machine stops with all tools returned to starting position.

A similar type lathe is used for the flange turning operation. Varying application of multiple tooling or single tracers to either rear or overarm carriages is possible on these lathes and complete "in line" automation can be engineered to specific production requirements.

DESIGN FEATURES

- ▶ Simplified changeover features for reduced set-up time.
- ▶ Feed rate may be automatically changed during cutting cycle.
- ▶ Streamline design for efficient chip guarding.
- ▶ Screw feed to all carriages.
- ▶ Four speed head with automatic change-over.
- ▶ Large chip flow area.
- ▶ All templates clear of chip area.
- ▶ All ways hardened, ground and replaceable.
- ▶ Open front design facilitates loading and unloading.
- ▶ Straight line diameter adjustment for tracer tools ...no shoulder length change to correct.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.
WRITE FOR BULLETIN AQE

NEW SENECA FALLS

MODEL LQ AND AQ AUTOMATIC LATHES



best on every point
... and among high speed steels
the top performer is REX

To leap the hurdle of competition, a product needs performance born of quality. And Crucible's REX® high speed steel has it — in accurate size ... sound uniform structure ... dependable response to heat treatment ... optimum tool performance.

Now, thanks to improved manufacturing techniques, REX is even better — more uniform. Put it to work on your next job, and you'll quickly know why REX is today, as it has always been — *the standard by which all other high speed steels are compared.*

Call for REX at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for a list of available data on REX and other Crucible *special steels*, write now for a free copy of the "Crucible Publication Catalog." Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

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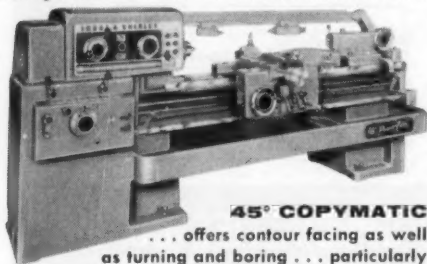
TAKE YOUR CHOICE . . .



45° or 90° *Powerturn* COPYMATICS LODGE & SHIPLEY TRACER CONTROLLED LATHES

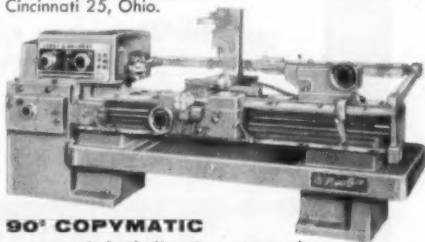
Lodge & Shipley produces both these versatile duplicating lathes! Now, choose the type that perfectly suits your production. Speaking of production, these new lathes really produce at low cost. They combine proven advantages of all-hydraulic duplication . . . featuring either 45° or 90° tracing slide . . . with all the new POWERTURN features.

There are 5 new sizes and types of COPYMATICS suitable for your needs. Complete details are available in two new pieces of literature: Bulletin 309, 90° COPYMATIC and Bulletin 310, 45° COPYMATIC. For your copies, address: The Lodge & Shipley Company, 3055 Colerain Ave., Cincinnati 25, Ohio.



45° COPYMATIC

. . . offers contour facing as well as turning and boring . . . particularly suited for turning contours involving diameters connected to faces by curves!



90° COPYMATIC

. . . traces in both directions: toward head or tail . . . faces exactly square shoulders . . . maximum versatility and tracing capacity!

more than ever before . . .
your LODGE-ical choice is **Lodge & Shipley**

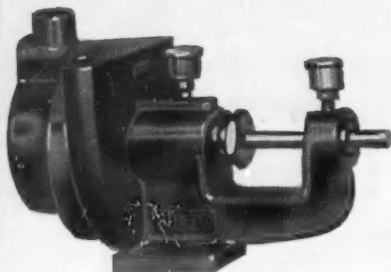


CENTRIFUGAL COOLANT PUMPS

Precision-designed and engineered to do
ONE THING and **DO IT BEST:**

**KEEP TOOLS COOL AND
MAKE THEM WORK BETTER
AND LAST LONGER**

For the machine tool and other industries,
FULFLO COOLANT PUMPS play an inestimable part in



MODEL PRS4
Right rotation

MODEL PLS4
Left rotation

Direction connection;
1800 to 2600 rpm;
3½ to 5 gal. per min.

PROLONGING TOOL LIFE AND REDUCING EQUIPMENT COSTS

Direct, motor or belt driven.
Vertical or horizontal installation. Capacities from ¼ HP to 1 HP; pipe sizes from ¾" to 1½".

WRITE FOR PERSONAL COPY
— on your letterhead — of
FULFLO MECHANICAL DATA BOOK. Please state if for
Pumps, for Valves or for both.



THE FULFLO SPECIALTIES CO. Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

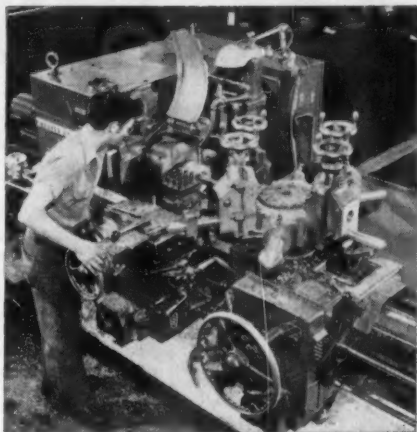
For more data circle 225 on Reader Service Card

WARNER & SWASEY 1-A efficiently handles small lot brass work at Beloit Iron Works

Giant, city-block-long paper making machines made by Beloit Iron Works, Beloit, Wisconsin, require hundreds of different precision machined parts—in extremely small lots. For much of their turning work, Beloit depends on a large battery of Warner & Swasey turret lathes, machines ideally suited to the different classes of small lot work they have.

A new Warner & Swasey 1-A Universal Extra Heavy Duty Turret Lathe was selected to handle an especially critical turning problem. This involved the production of brass castings in lots less than 15 pieces, where the qualities of high speed and great power are required, in addition to extreme machine maneuverability. The new Warner & Swasey 1-A is designed to meet just such demands!

Its zoned operating controls put all machine controls within easy reach. Operators can quickly and easily set the cross slide, the hex turret unit, or position tools. The 1-A's all-clutch headstock permits instantaneous speed changing for fast, effortless headstock handling. And for threading or forming cuts, a 4 to 1 speed reduction can be obtained instantly without preselection merely by flipping the speed change lever in the opposite direction. The power chuck wrench further speeds handling time, cuts operator fatigue. A 30 hp, two-speed motor furnishes all the power necessary for high



speed brass turning plus a range of 32 unduplicated cutting speeds.

This 1-A, like the other Warner & Swaseys, has proved its efficiency for Beloit Iron Works because it is matched with the type and range of work for which it is designed. Our Field Representative will be glad to work with you to select the machine tools that will similarly best suit your needs.



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

For more data circle 226 on Reader Service Card

June, 1956

modern machine shop 27

now...

VALUABLE DIE-SET DATA FOR ALL TOOL ENGINEERS

It's easy-to-look-at! More than 200 pages are specially edited and arranged for quick and simple reference. Full color is used to make tables easier to read, illustrations more clear. The easy-to-look-at format plainly indicates all optional features. Covering the complete Danly "Leadership Line", this catalog presents full dimensional data and specifications for all Danly Die-Sets, Diemakers' Supplies, Bolster Plates and Bolster Plate Accessories. Get your copy of this new easy-to-look-at Danly catalog. *Write for it today.*

EASIER SELECTION—
MORE COMPLETE DESIGN INFORMATION



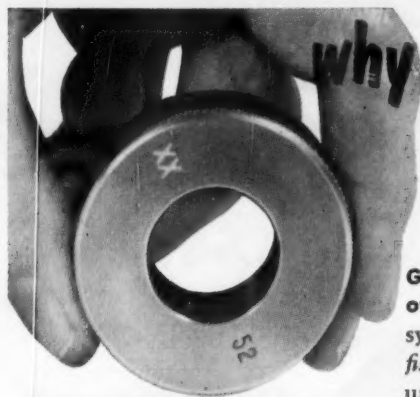
WRITE FOR YOUR FREE COPY TODAY!

DANLY

DIE SETS AND
DIEMAKERS' SUPPLIES

DANLY MACHINE SPECIALTIES, INC.

2108 South Laramie Ave., Dept. G, Chicago 50, Ill.



why you need only **ONE master!**

The system of the Dimensionair Air Gage is basically different from that of other Air Gages. One side of the system—the measuring side—is *rigidly fixed*. There is no adjustment and measurements *cannot vary*. Hence, the gage is *linear* over its long range and *can be calibrated and set with a single master*. Because of this, the Dimensionair cannot drift . . . throughout its long range.

The **balancing side of the system** has a *single zero* adjustment. You set the Dimensionair positively and instantly to zero, *with a single master*.

If you are familiar with ordinary Air Gages requiring two masters, you'll

appreciate the advantages of using *one* master. And you'll experience for the first time the feeling of *dependable, non-drifting*, precise measuring.

The Dimensionair's basic system enables it to be *combined directly* with electrical and electronic units as used with *Machine Control* and *Automatic Sorting Gages*. This eliminates the accessory equipment required by other air gages and permits higher speeds, greater precision — with assured stability. It's much easier to set the gage to the spread between electrical contacts; e.g. the spread between the machine's fine feed and the finish feed. Adjusting to zero does *not* affect this spread setting.

Check these facts for yourself. Ask us to install a Dimensionair in your plant. Compare it with *any other air gage!*

FEDERAL PRODUCTS CORPORATION
6146 Eddy Street • Providence 1, R. I.

Ask **FEDERAL** First

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

For more data circle 228 on Reader Service Card

Something more



than craftsmanship

produces that built-in accuracy of a

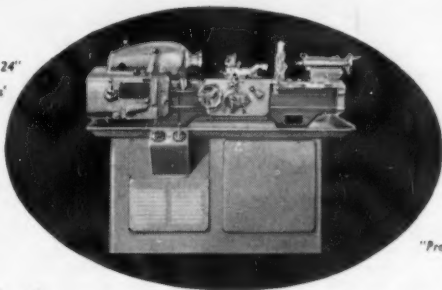
Hendey Tool and Gage-Makers' Lathe

The best is not good enough for Hendey craftsmen who produce machines like our 9 in. Tool and Gage-Makers' Lathe — machines that give you toolroom tolerances easily, with no "tricks" or time-consuming adjustments.

One of our men is grinding a spindle in the picture on the opposite page. It's the *care* he uses in each step of the operation that makes the difference between a good spindle and a superior one. Constant operating accuracy and rigidity are assured because the spindle is mounted by other "craftsmen who care" in super-precision, antifriction bearings at both ends.

An electronically controlled drive is available for this 9 in. Tool and Gage-Makers' Lathe to give you quiet, infinitely variable spindle speeds from 15 to 3000 rpm. On facing cuts, stepped diameters, and tapers, you can change speeds during the cut by selecting the desired rpm on the control rheostat. Belt drive gives you smooth, vibration-free power to the spindle for fine finishes in the 25 to 3000 rpm range. Speed range from 15 to 250 rpm is achieved by back gears which operate at very low velocity. Call your Hendey dealer for information about this machine.

Hendey 9" x 24"
Tool and Gage-Makers'
Lathe



"Precision with Production"

Hendey machine division
BARBER-COLMAN COMPANY
64 LOOMIS ST., ROCKFORD, ILLINOIS



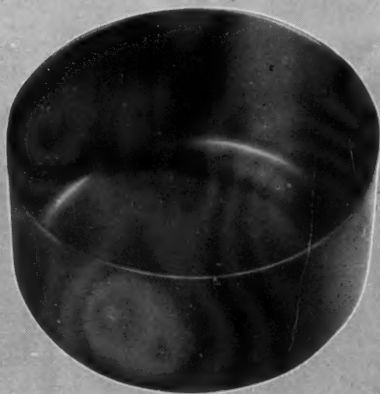
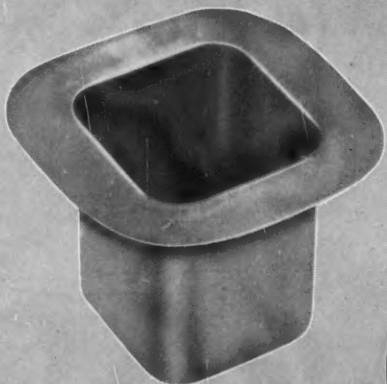
For more data circle 230 on Reader Service Card

TRANSFORMER HOUSINGS

drawn on

OTTAWA 60

DIES



No Rejects due to
Die Wear after
more than 12 times
the ordinary run!



**Write for a copy of the
OTTAWA 60 BLUE SHEET**

This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.

ADDRESS DEPT. MS-78

OTTAWA 60 is a new die steel, an A-L "original," developed primarily to deep draw and form stainless steel. As intended, it performs without galling or pickup and shows exceptional wear resistance in that service. We have plenty of case histories to show you in proof.

But wherever you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-hard-

ing die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. *Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.*

• You can solve many a problem and save real money with Ottawa 60 draw dies! Write for information or call in our Field Service Staff to help you get started. Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

For complete **MODERN** Tooling, call
Allegheny Ludlum

WHD 5463



For more data circle 231 on Reader Service Card

↓ Use this Reader Service Card for requesting more information on products described and advertised ↓

READER SERVICE CARD

June 1956 Issue

GOOD UNTIL AUGUST 1, 1956

Your Name _____ Your Title _____

Company Name _____

Company Address _____

City _____ Zone _____ State _____

Products Manufactured _____ Number of Plant Employees _____

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

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2121	340	359	378	397
2122	341	360	379	398
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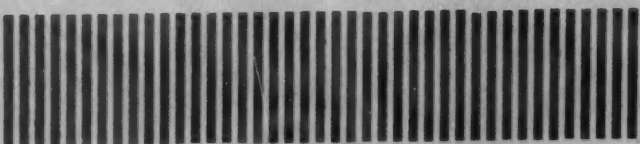
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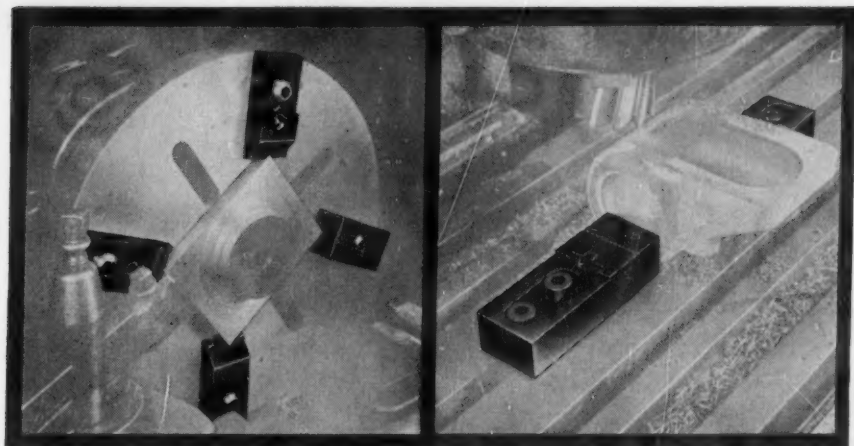
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NEW YORK 14, NEW YORK**





J & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES
LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS

Eliminate "U" Clamps, Straps and Fingers, cut handling time 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

Need no U-clamps or straps

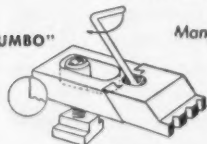
With J & S "All-Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within $\frac{1}{8}$ " of the face plate or table.

You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes. Write for complete information today.

J & S "JUMBO" and "LI'L GIANT" JAW CLAMPS

For large planers

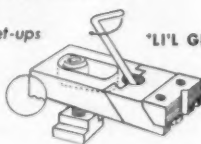
"JUMBO"



Many times more powerful than finger set-ups

COMPLETELY HARDENED

"LI'L GIANT"



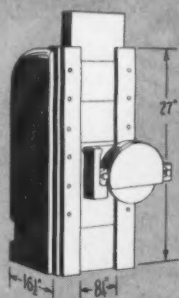
Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. $\frac{1}{8}$ " back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage



WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

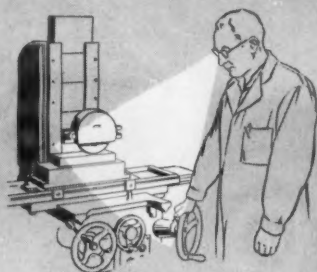
871 DORSA AVENUE, LIVINGSTON, NEW JERSEY

For more data circle 232 on Reader Service Card



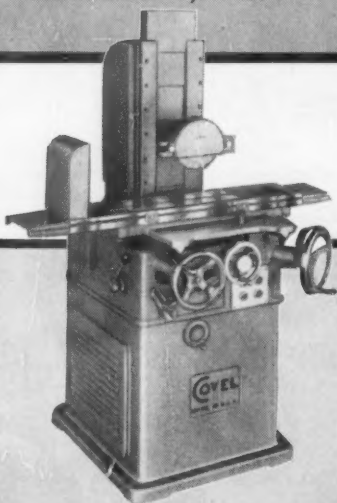
RIGID VERTICAL SLIDE

Grinding wheel and head are supported by the rigid vertical slide which is 16½" in depth. Length of vertical ways is 27". Distance between vertical ways is 8¼".



CONVENIENT CONTROLS

Elevating hand wheel with floating vernier dial pointer is handily located below table level where it doesn't interfere with operator's access to the work. Power cross feed engaged by control on front of cross feed hand wheel.



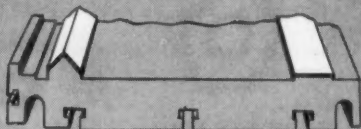
Engineered to give you the most accurate gage, form tool and surface grinding performance for a low initial cost.

COVEL No. 10

HAND OR POWER FEED

SURFACE GRINDER

6" x 18" x 15"



HARD CHROME TABLE WAYS

Hard chrome plating preserves the original built-in accuracy. Chrome is applied direct to alloy cast iron surface of V and flat table ways after they are precision hand-scraped.

You'll want to know all about the rugged, low-cost No. 10, so write or 'phone today for all the details.

COVEL PRECISION GRINDERS

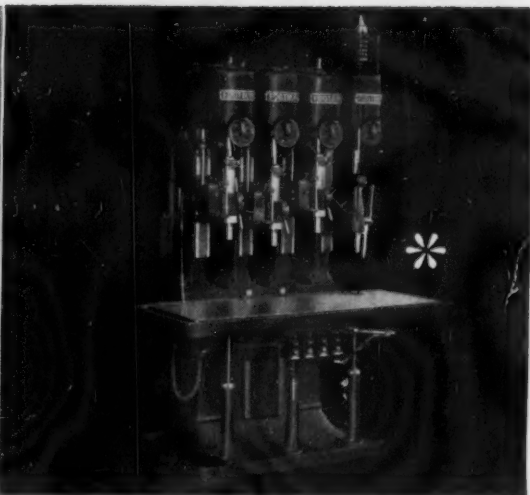
HYDRAULIC & HAND FEED SURFACE GRINDERS

UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS

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BENTON HARBOR,
MICHIGAN
WAlnut 6-6157

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■ No. 2 Machine with Back Gear • 12" Overhang •
 5/8" Drilling Capacity in Steel • Optional Speed Ranges
 • 185 to 2300 RPM • 280 to 3450 RPM • Vertical
 Motor Drive with Standard Single Speed Motor • Power
 Feed Assembly • Tapping Attachment • Coolant Outfit.

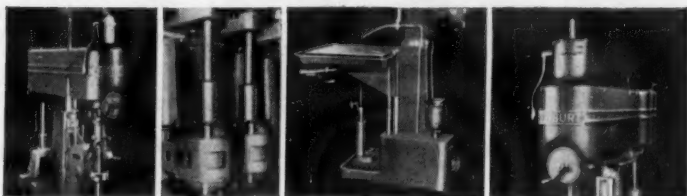
Sensitive **drilling machines**

A FULL RANGE DRILLING MACHINE ENGINEERED FOR PRODUCTION

■ Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitive are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counter-boring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1, 2, 3, 4, 6 Spindle Models.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building



*Engineered
for
production*

FOOTBURT
MACHINE TOOLS

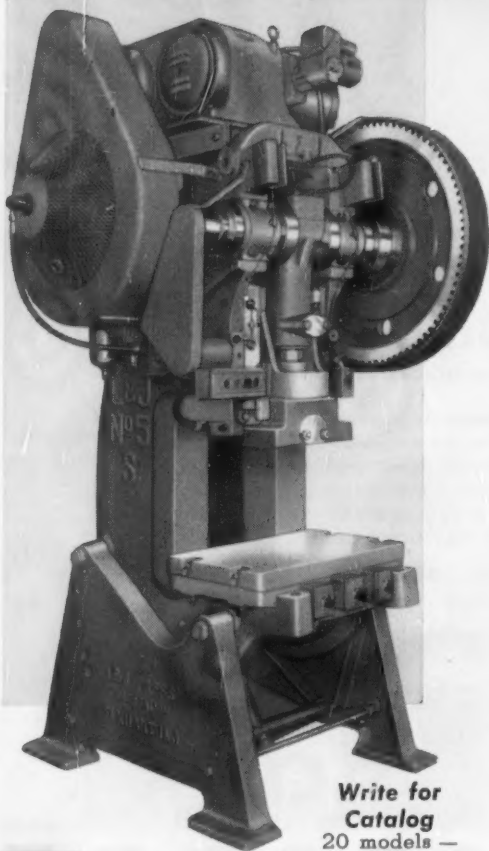
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June, 1956

modern machine shop 35

New L&J No. 5 PRESS

Keeps Production Efficient



**Write for
Catalog**
20 models —
14 to 90 tons

A completely new 56-ton O.B.I. punch press with the quality, accuracy and versatility to keep production costs down. It combines in a widely adaptable size the proven features that have made L&J Presses popular in all types of press shops.

Exceptional rigidity gives longer die life and precision products. Its ruggedness makes routine work of tough jobs while maintenance is held to a minimum.

This is the press you need for better work at lower costs.

Air clutch on back shaft, variable speed drive and flanged ram optional at extra cost. Non-g geared type also available.

Specifications

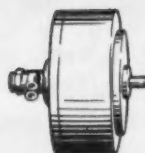
Capacity—56 tons. Standard stroke—4". Maximum stroke (to order)—6". Strokes per minute—46 (non-g geared 95). Die space—11¼" to 18¼", stroke down, adj. up.



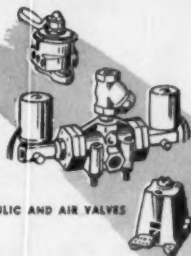
L&J Press Corporation

1624 Sterling Ave.
Elkhart, Indiana

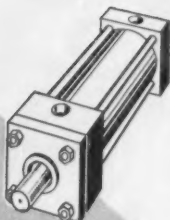
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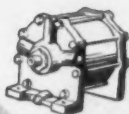
ROTATING AIR CYLINDERS



HYDRAULIC AND AIR VALVES



LOGANSQUARE AIR CYLINDERS

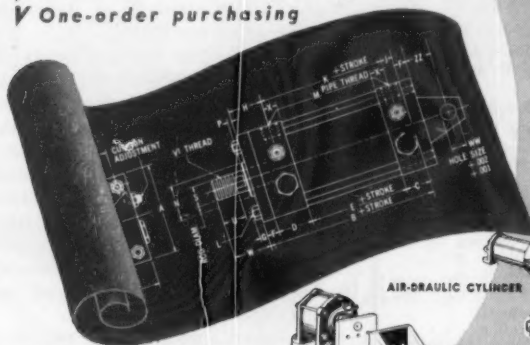


NONROTATING AIR CYLINDERS

specify ... **Logan**

YOUR DEPENDABLE "ONE-SOURCE" SUPPLIER FOR ALL YOUR AIR AND HYDRAULIC EQUIPMENT...

- ✓ One-manufacturer responsibility
- ✓ One-source manufacturing
- ✓ One-order purchasing



MEMBER: Natl. Mach. Tool Builders' Assn., Natl. Fluid Power Assn.



HYDRAULIC AND AIR PRESSES



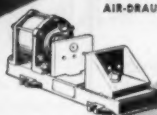
SURE-FLOW COOLANT PUMPS



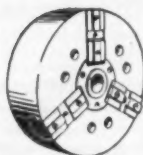
AIR-DRULIC CYLINDER



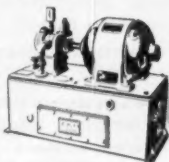
ROTOCAST HYDRAULIC CYLINDERS



AIR-OPERATED VISES AND FIXTURES



AIR AND HYDRAULIC OPERATED CHUCKS



HYDRAULIC POWER UNITS

PROPERLY DESIGNED . . .
PROPERLY EQUIPPED BY



Logan

YOUR DEPENDABLE "SINGLE SOURCE"
For All AIR or HYDRAULIC Equipment

LOGANSPOUT MACHINE CO., INC.
801 CENTER AVENUE, LOGANSPOUT, INDIANA

PLEASE SEND COPY OF CATALOG:

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| <input type="checkbox"/> 100-1 AIR CYLINDERS | <input type="checkbox"/> 62 SURE-FLOW PUMPS |
| <input type="checkbox"/> 100-2 MILL-TYPE AIR CYLS. | <input type="checkbox"/> 200-1 HYD. POWER UNITS |
| <input type="checkbox"/> 100-3 AIR-DRULIC CYLS. | <input type="checkbox"/> 200-2 ROTOCAST HYD. CYLINDERS |
| <input type="checkbox"/> 100-4 AIR VALVES | <input type="checkbox"/> 200-3 750 SERIES HYD. CYLINDERS |
| <input type="checkbox"/> 100-5 LOGANSQUARE CYLINDERS | <input type="checkbox"/> 200-4 HYD. VALVES |
| <input type="checkbox"/> 100-5-1 ULTRAMATION CYLINDERS | <input type="checkbox"/> 200-5 FITTINGS |
| <input type="checkbox"/> 51 PRESSES | <input type="checkbox"/> 75-1 CHUCKS |
| <input type="checkbox"/> FACTS OF LIFE | <input type="checkbox"/> ABC BOOKLET |
| | <input type="checkbox"/> CIRCUIT RIDER |

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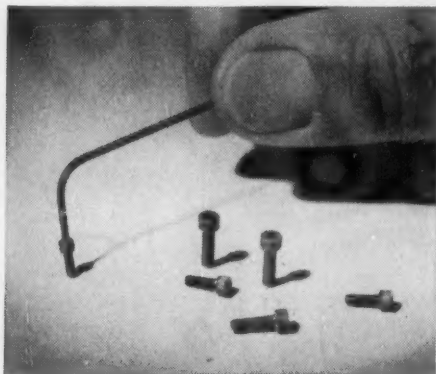
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COMPANY _____

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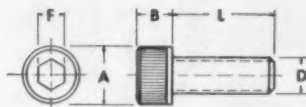
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Miniature screws aid standardization of small devices



Standard UNBRAKO miniature socket head cap screws are available in sizes # 0, # 1, # 2 and # 3, in heat treated alloy steel or stainless steel, at your authorized industrial distributor's. Standard lengths range from $\frac{1}{8}$ to $\frac{1}{2}$ in.

HEAT-TREATED ALLOY STEEL Class 3 Fit Standard



	Diameter	Threads per inch NC NF	Length	Recommended Installation Torque in Inch-Pounds		Weight per 1000 in Pounds
				NC	NF	
#0	A .104	80	$\frac{1}{8}$	2.0		.152
	B .060	80	$\frac{3}{16}$	2.0		.182
	D .060	80	$\frac{1}{4}$	2.0		.210
	F .050	80	$\frac{3}{8}$	2.0		.265
#1	A .118	72	$\frac{1}{8}$	3.5		.27
	B .073	72	$\frac{3}{16}$	3.5		.32
	D .073	72	$\frac{1}{4}$	3.5		.37
	F .050	72	$\frac{3}{8}$	3.5		.47
#2	A .140	56	$\frac{3}{16}$	6.0		.42
	B .086	56	$\frac{1}{4}$	6.0		.50
	D .086	56	$\frac{3}{8}$	6.0		.58
	F $\frac{1}{16}$	56	$\frac{1}{2}$	6.0		.70
#3	A .161	48	$\frac{3}{16}$	8.5		.59
	B .099	48	$\frac{1}{4}$	8.5		.70
	D .099	48	$\frac{3}{8}$	8.5		.81
	F $\frac{3}{16}$	48	$\frac{1}{2}$	8.5		1.03

For more data circle 237 on Reader Service Card

Tiny close-tolerance Unbrako screws available in standard sizes

New economies in the design of space-saving small equipment are now possible with these UNBRAKO miniature socket head cap screws. Manufactured to time-piece precision, available locally, they save the costly necessity of designing special screws to fasten tiny parts in compact units. They're ideal for use in typewriters, calculators and computers, servomechanisms, electric and electronic equipment—and in countless other small intricate devices where maximum reduction in bulk and weight is required with no sacrifice in strength of individual components or assemblies.

Fingers grip the knurled heads on these tiny screws positively for easy handling and fast assembly. Uniform hex sockets assure maximum wrenching torque. Controlled fillets under the heads prevent shearing of the heads. Threads are fully formed for maximum strength and exact fit. Extremely accurate head diameters permit their use in counter-sunk holes, saving weight by reducing the length of the screw required and making flush designs possible.

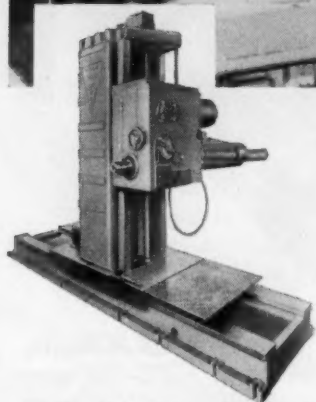
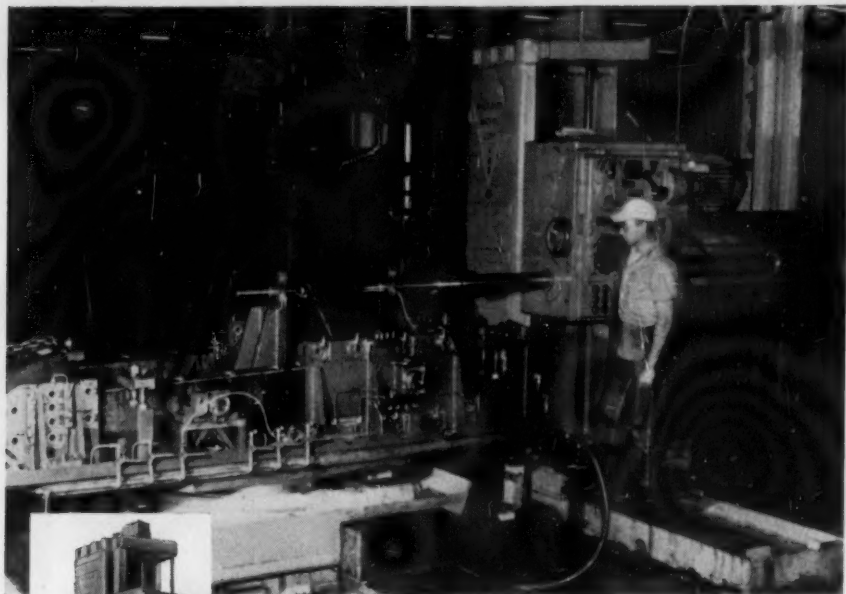
These standard UNBRAKO miniature screws are available at your authorized industrial distributor's. See him today. Or write us for Bulletin 2055 and samples. STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

Standard screws are threaded to the head. Special materials, lengths, and threaded lengths are available. One "High-Titan" UNBRAKO hex key is included with each package of 100 screws.

UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS
JENKINTOWN PENNSYLVANIA



A JOB THAT ONLY

A *Kaukauna*

HORIZONTAL DRILLING, TAPPING AND BORING MACHINE

**CAN DO—faster, easier,
at lower production cost**

All four sides of the main frame for a crawler type diesel tractor are drilled and tapped, reamed or chamfered, on a Kaukauna Model 3040 Horizontal Drilling, Tapping and Boring Machine at the plant of a nationally known manufacturer of farm equipment **with one setup.**

The tractor frame is approximately 10 ft. long by 4 ft. wide and therefore the Model 3040 permits a full 120 in. travel of the column on the runway. In this setup, the tractor frame is dropped by overhead crane into a fixture on a power driven rotary table located in front of the Kaukauna and the production operation is simple, accurate and rapid:

—Set up frame in fixture—Drill, Tap and Chamfer 16 holes in first side—Index table 90°—Drill,

Chamfer and Tap 6 holes in second side—Index 90°—Drill 16 holes; drill and ream 2 dowel holes in third side—Index table 90°—Drill, Chamfer and Tap 6 holes—Remove frame from fixture.

Complete machine operation is by convenient push button controls located at the front of the headstock. An unusual 42" spindle travel eliminates any need for tool extensions and insures maximum tool rigidity. Operator working conditions are ideal because the usual pit or platform is not necessary, and crane time is kept at an absolute minimum.

Learn now what a Kaukauna will do for you by time estimates on your various jobs. Consult your nearest Kaukauna distributor, or phone, wire or write direct.



KAUKAUNA MACHINE & FOUNDRY DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

KAUKAUNA, WISCONSIN, U.S.A.

TELEPHONE ROCKWELL 6-4631

CABLE KAUMACH

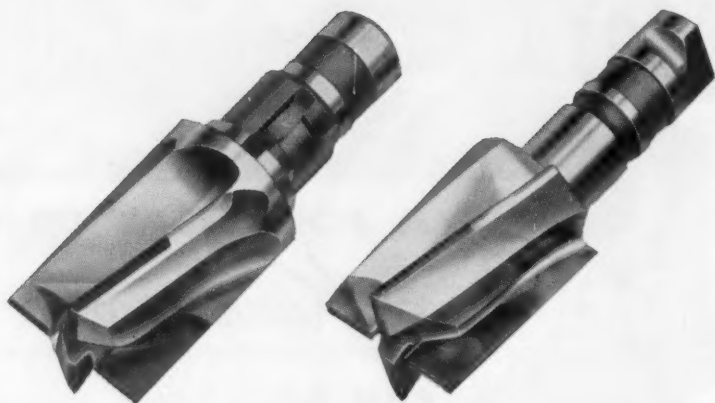
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June, 1956

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NOW!

A COMPLETE LINE OF STANDARD CARBIDE TIPPED COUNTERBORES



Standard tungsten carbide tipped cutters in both Pin and Radial Drive are now carried in stock for immediate shipment. Diameters range from $\frac{3}{8}$ " to 2" in $\frac{1}{16}$ th sizes, and from 2" to 3" in $\frac{1}{8}$ th sizes.

Improved flute design provides better chip disposal and longer carbide tips insure longer tool life. Minimum root diameters permit the use of a greater range of standard Eclipse Pilots.

We also carry a complete stock of High Speed Steel Counterbores, Countersinks, Inverted Cutters and Core Drill Cutters, as well as holders and pilots. Special Carbide Tipped and High Speed Steel Tools in various drives will be quoted promptly on request.



ECLIPSE COUNTERBORE COMPANY

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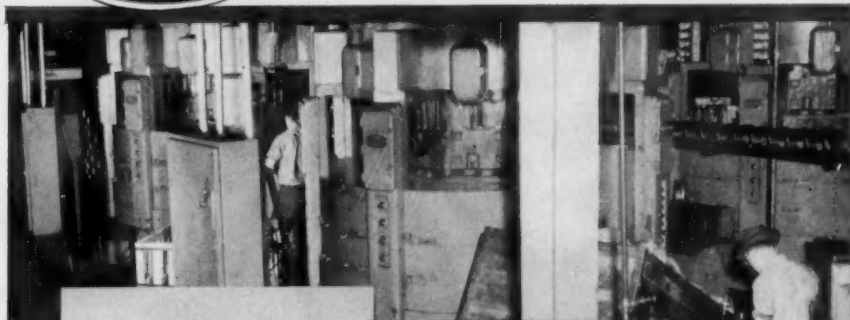
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Automobile Manufacturer produces

Repetitive Pieces to Close Tolerances with

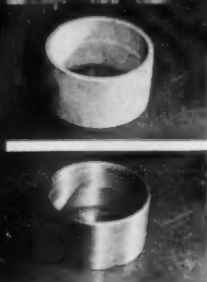
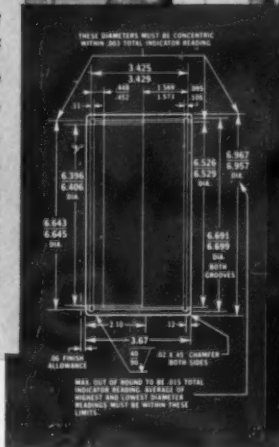
BULLARD

MULT-AU-MATIC Type "L"



At one of the nation's largest automotive plants, a number of Bullard Mult-Au-Matics, Type "L" are employed to produce automatic transmission parts. According to the Process Engineer "The transmission is the most precision piece of equipment in the entire car — with many moving parts fabricated to close tolerances."

If you have need to manufacture to exacting tolerances it will pay you to investigate the many advantages offered by Bullard Mult-Au-Matic, Type "L".



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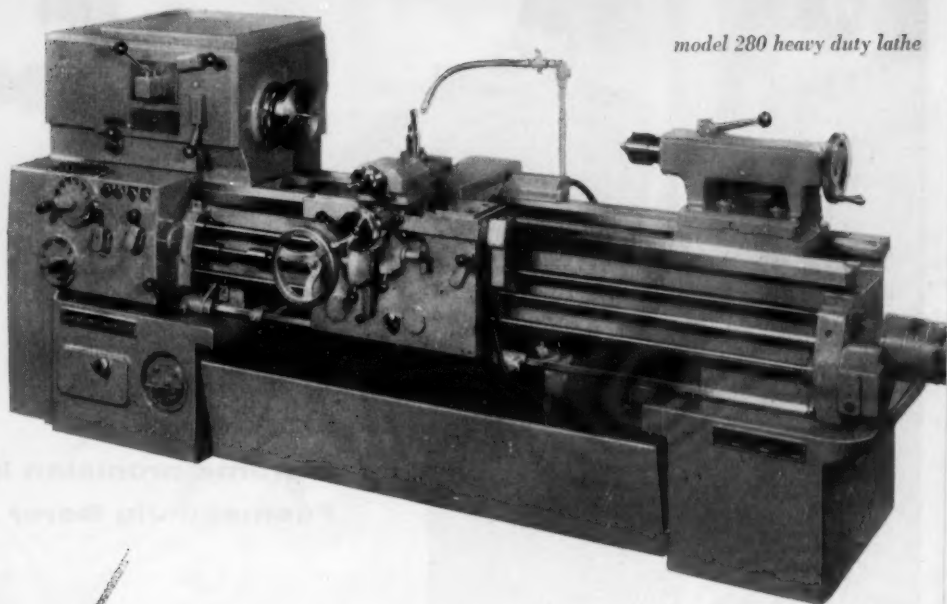
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 286 CANFIELD AVENUE — BRIDGEPORT 9, CONNECTICUT
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NEW MULT-AU-MATIC, TYPE "L" CATALOG

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 COMPANY _____
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 CITY _____ ZONE _____ STATE _____

For more data circle 240 on Reader Service Card



model 280 heavy duty lathe



it does more work for less money

Springfield is proud to present a new heavy-duty 16" engine lathe, the Model 280. It offers high horsepower—10, 15 or 20 hp—for heavy cuts, clean design, and ease of operation, all at a reasonable price. Direct simplicity and straightforward design assure low maintenance cost.

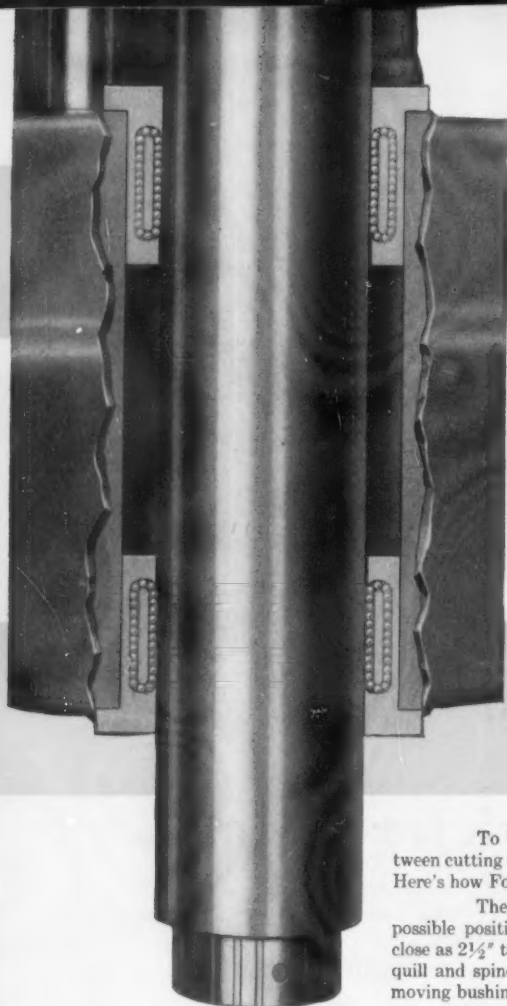
It has no electronic brain, because Springfield believes that most of today's jobs still require craftsmanship of the human variety. In the Model 280 the price is for the tool, not the brain.

Only the gears necessary for a given speed are in mesh. Sixteen speeds to choose from, 60 feeds and threads—available instantly to any operator. Unique sealed oil spray lubricates and cools gears. It's the lathe most easily converted to contouring and reproducing with accessories, without budget strain. If you're in the quality market for a new heavy-duty lathe that still respects the contribution of craftsmanship, the Model 280 is for you. Basic price FOB Springfield, Ohio, \$8,013.

*The Springfield Machine Tool Company
Springfield, Ohio*

68TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

SPRINGFIELD



NEW QUILL BEARING DESIGN helps achieve extreme precision in Fosmatic Jig Borer

To bore with precision as close as $\pm .0001"$, distance between cutting tool and lower quill bearing must be held to a minimum. Here's how Fosdick minimizes this crucial distance.

The lower quill bearing is *permanently* located at the lowest possible position in the head, permits boring with spindle nose as close as $2\frac{1}{2}"$ to the bearing. Bearing does not ride up and down with quill and spindle as in conventional designs where balls are held in moving bushings.

The permanent location of quill bearings is made possible by unique Fosdick design—vertical ball races with preloaded precision balls circulating continuously. This design also permits spindle and quill to be shorter; thus stronger and more rigid. Both are perfect cylinders with no cuts on the outside.

Engineering advancements like this make the Fosmatic Jig Borer the most rigid and precise boring machine you can buy. Write today for the new catalog.

Eight models available from the low-cost Model 30 with 36" x 18" table, to the virtually automatic model 54P with 54" x 22" table. Other important features: Automatic Positioning, choice of two precision measuring systems, milling feed, rapid traverse to quill, power clamping of table and saddle, coolant system and reversing motor control for tapping.

NEED JIG BORING EQUIPMENT? GET A PROPOSAL FROM FOSDICK!



Fosmatic
Radial Drills



Jig
Borers



Sensitive and
Upright Drills



Sensitive
Radial Drills



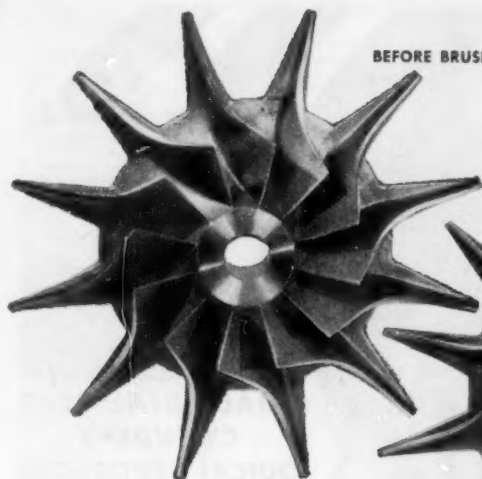
Jig
Grinders



Automatic Positioning
Jig Borer

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO



BEFORE BRUSHING



AFTER BRUSHING

Super finish for turbo-supercharger



A leading manufacturer of turbo-superchargers uses Osborn's Brushmatic® 3A to cut compressor wheel finishing costs from 4¢ to 1¢ per part.

*Trade-Mark

THIS aluminum compressor wheel is the heart of a new turbo-supercharger designed to increase engine horsepower up to 60%. Osborn power brushing methods remove all machining burrs from this compressor wheel . . . maintain a finish tolerance of two ten-thousandths of an inch. In addition to improving the quality of this compressor wheel, Osborn power brushing cuts finishing time from 12 minutes to 4 minutes per part.

The automotive industry is just one of many using Osborn power brushing to improve and speed up finishing operations.

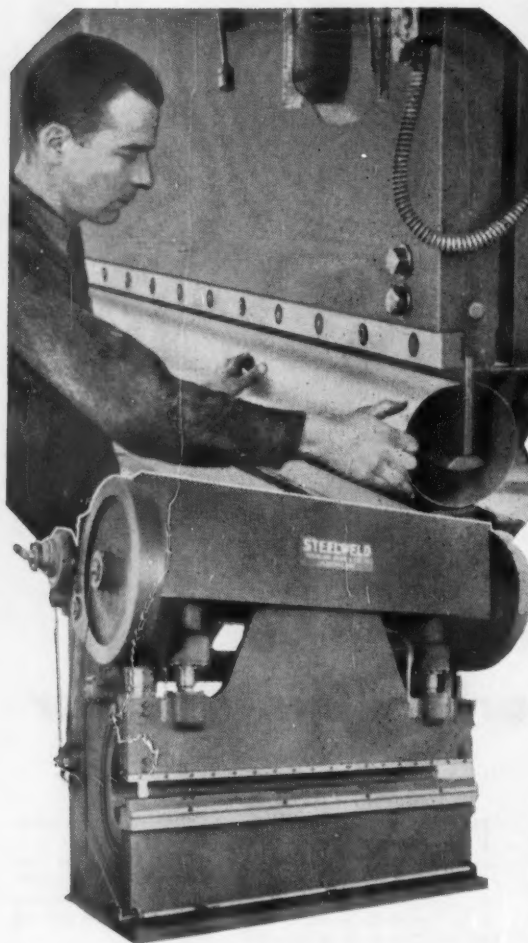
An Osborn Brushing Analysis, made in your plant, will show how you can improve finishes, reduce finishing costs. Write The Osborn Manufacturing Company, Dept. B-5, 5401 Hamilton Avenue, Cleveland 14, Ohio.

Osborn Brushes



BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

For more data circle 244 on Reader Service Card



Forming a 6-inch diameter cylinder on a Cleveland Steelweld Press. Machines can be furnished for forming cylinders in lengths up to 20 feet.

SMALL DIAMETER CYLINDERS QUICKLY PRODUCED

Small diameter cylinders, square and hexagon tubing and other closed shapes are easily made with simple dies on Steelweld Presses. Special steel dies are usually used for large quantities, but for small numbers a steel male die and a female pressure pad made of rubber is often used.

A series of successive bends are made starting at the ends of the sheet and finishing with the center bend. The dies are so made that the cylinder or tube when removed from the machine will spring to a closed position.

This is only one of the dozens of different jobs that can be done on any Steelweld.



GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

6416 East 281st Street • Wickliffe, Ohio

STEELWELD

BENDING PRESSES

BRACING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

For more data circle 245 on Reader Service Card

A few precision pieces produced on Gorton 2- and 3-dimensional Pantographs which saved time and money.



240 Pieces per hr.:
serpentine groove
cut in 1213 steel
.1903" + .0014"
× .109" + .003".
Finish 35 mcr.

GORTON

Multiple Pantographing

VOLUME PRODUCTION — PRECISION TOLERANCES

Tool Room Accuracy and High Production are Gorton Characteristics! From a dozen to a million pieces at exceptional repetitive accuracy. From two to six different operations performed at one setting. Automatic Cycling during engraving, milling, profiling, chamfering, counter-boring, grooving, routing, slotting, graduating, grinding, etching. Production is dependent only on cutter capacity. Spindle speeds from 900 to 45,000 R.P.M. Conventional or climb milling. Manual control for short runs. Automatic cycling for production runs.

3 Services Available

1. 16 Standard Models
2. Expertly-Designed Special Tooling
3. Custom-Built Special Machines

Newest Gorton 2-dimensional Pantograph, PI-2 Heavy-Duty model.



Write for
Bulletins
1655,
2595-DS,
2604-DS
1706.



GEORGE GORTON MACHINE CO.

1706 RACINE STREET

RACINE, WISCONSIN

56-4A

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special... Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

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A 8846-1PA

June, 1956

modern machine shop 47

CLIP THIS TO GET LONGER TOOL BIT LIFE



The du MONT CORPORATION,
Greenfield, Mass.

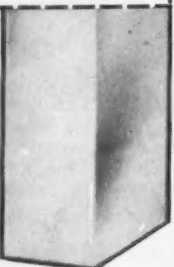
MAIL FREE Tool Bit COMPARISON
CHART, CATALOG and PRICE LIST
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Name.....

Company.....

Address.....

duMont Tool Bits
hold a keener cutting
edge longer, give
you more cuts per bit
more cuts per dollar.
That's because *tough-
ness, red hardness and
wear resistance* are in
almost perfect
balance.



**duMONT
TOOL BITS**

High Speed,
Ground Square and
Rectangular

For more data circle 247 on Reader Service Card

48 modern machine shop

Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

June 3-6 • American Gear Manufacturers Association, Annual Meeting, Homestead, Hot Springs, Va. Association headquarters: 1 Thomas Circle, Washington 5, D. C.

June 5-8 • Material Handling Institute Inc., Material Handling Exposition, Public Auditorium, Cleveland. Institute headquarters: 1 Gateway Center, Pittsburgh 22, Pennsylvania.

June 6-8 • American Society for Quality Control, Annual Meeting, Mt. Royal Hotel, Montreal, Quebec. Society headquarters: 50 Church St., New York 7, New York.

June 7-8 • Machinery & Allied Products Institute, Annual Meeting, Hotel Statler, Washington. Institute headquarters: 1200 18th St., N. W., Washington 6, D. C.

June 17-21 • American Electroplaters' Society, Annual Meeting, Hotel Statler, Washington. Society headquarters: 445 Broad St., Newark, New Jersey.

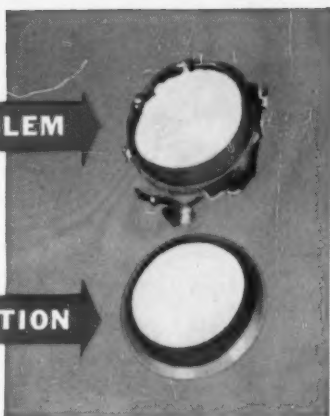
June 22-July 6 • International Machine Tool Exhibition, Olympia, London, England. Information: The Machine Tool Trades Association (of Great Britain), Victoria House, Southampton Row, London, W.C. 1., England.

June, 1956

Deburr Holes
the modern
way...with

PROBLEM

SOLUTION



Cogsdill BURRAY^{*} TOOLS



INSTANTLY
ADAPTABLE TO

- Drill presses
- Motorized spindles
- Portable drill motors
- Automatic multiple spindle setups

The BurrAway's unique double-edged, retractable blade cuts clean chamfers, top and bottom, in a matter of seconds.

^{*}Patented

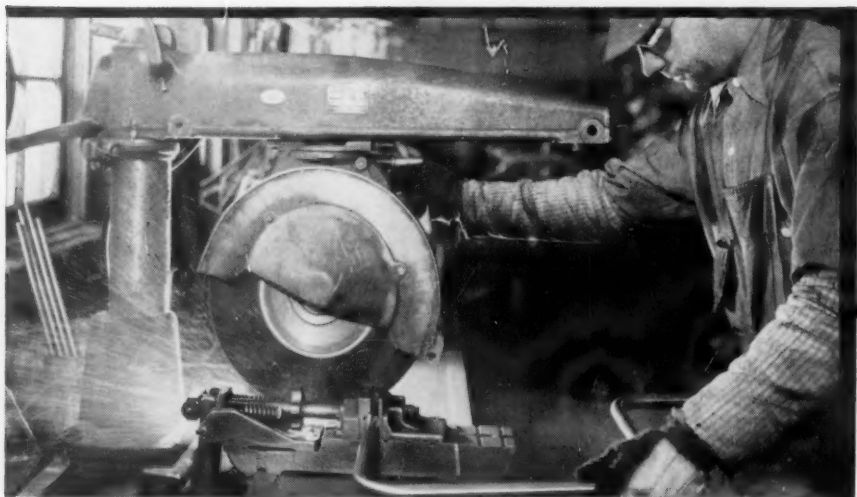


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Cogsdill TOOL PRODUCTS, INC.

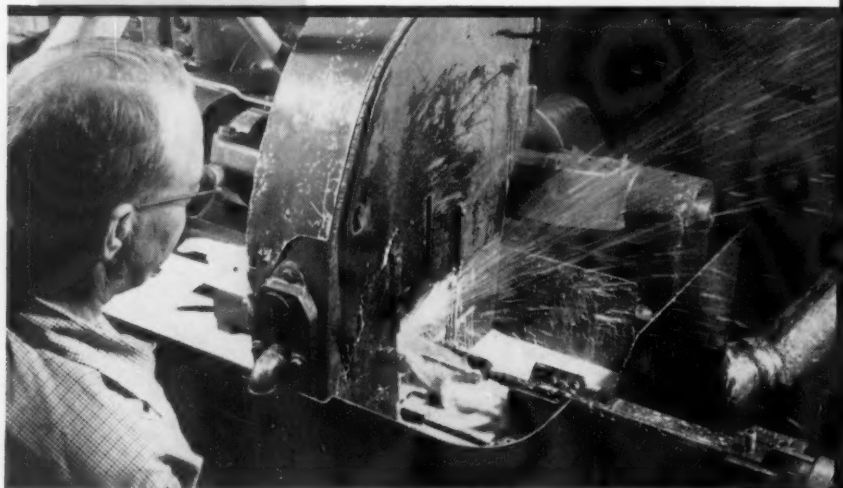
12980 W. Eight Mile Road, Oak Park 37, Michigan

For more data circle 248 on Reader Service Card



B9 RESINOID CUT-OFF WHEEL

The B9 is an ideal high production wheel, adaptable to speeds up to 16,000 sfpm. Available with either smooth sides, or with the rougher "F" sides for greater chip clearance. An exceptional performer on both ferrous and non-ferrous metals. For dry cutting only.



R50 RUBBER CUT-OFF WHEEL

Designed primarily for wet-cutting metal bar stock, the Norton R50 rubber bonded wheel handles diameters up to 6". Built-in chip clearance — unusual in this type of wheel — is an advantage for freer, cooler cutting, with minimum burr and without case hardening the work. Can also be used for dry cutting.

Three for thrift!

Norton cut-off wheels . . . fast, safe and long-lasting . . . bring you the profit-boosting "TOUCH of GOLD"

Norton has brought cut-off wheel development to the point where you can be sure of fast, clean cutting action, low rate of wear and a wide safety margin on every job.

That goes for all metals, from softest to hardest — for non-metals ranging from rubber hose to marble — and for any type of machine, high speed or low speed, swing frame, chopper, traverse, floor stand or portable.

Three of the most popular Norton cut-off wheels are shown here. See your Norton Distributor for practical help in wheel selection and facts on dry vs. wet methods for your cutting-off operations. Or write to the nearest District Office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

WV-1703



BN RESINOID CUT-OFF WHEEL

Extra strength and safety, plus knurled sides for more effective cutting action, make the reinforced, resinoid bonded BN wheel a great favorite for the widest range of jobs, especially non-ferrous operations. Other uses include: cutting wire rope; slotting railway track welds; tuck pointing; cutting fibre board, concrete, tile, plastics, and the like.



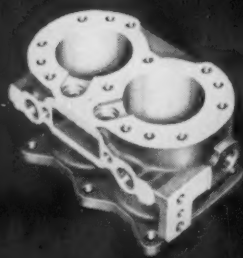
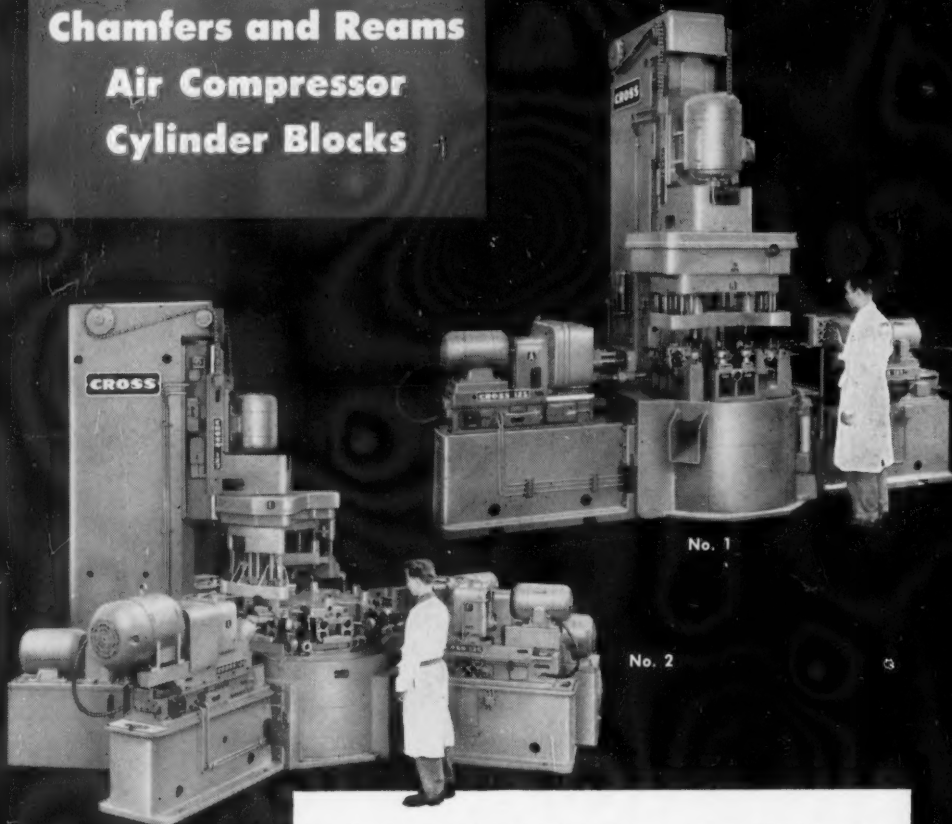
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-Cat Tapes

*Making better products . . .
to make your products better*

For more data circle 250 on Reader Service Card

**Bores, Drills,
Chamfers and Reams
Air Compressor
Cylinder Blocks**

More Specials by Cross



- ★ Rough and semi-finish bores cylinders; rough and finish counter-bores valve ports; drills, chamfers and reams all holes.
- ★ 129 pieces per hour at 100% efficiency.
- ★ Machine Number One has 4 stations; 1 for loading, 3 for drilling, chamfering and reaming. Machine Number Two has 7 stations: 1 for loading and 6 for machining.
- ★ 2 position, progressive type work holding fixtures for both machines, each arranged to handle 6 similar parts.
- ★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance and flexibility for part design changes.
- ★ Other features: Construction to JIC standards; hydraulic feed and rapid traverse; hardened and ground ways; automatic work cycle.

Established 1898

THE **CROSS** CO.
First in Automation
DETROIT 7, MICHIGAN

modern machine shop

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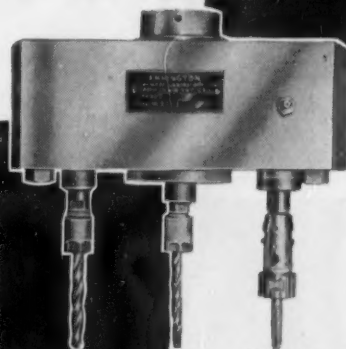
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modern machine shop
431 Main St. Cincinnati 2, Ohio

June, 1956

NOW
YOU CAN

- DRILL
- COUNTERSINK
- REAM
- COUNTERBORE
- TAP



**ERRINGTON
TAP-DRILL
ATTACHMENT**

Capacity to
1/4" drill and
5/16" tap.
Available
with 2, 3 or 4
Spindles. Spin-
dles spaced to
handle work
up to 5 1/2"
outside
diameter.

**ALL ON ONE
DRILL PRESS
SPINDLE**

... without taking your hand off drill press feed handle. Yes ... with this new Errington Tap-Drill attachment, you simply slide the work under the head from one spindle to another. An automatic reversing tapping spindle is built in, making it unnecessary to reverse the drill press for tapping. Hardened and ground spindles. Gears turned on spindles (not pinned on). Heavy duty grooved ball thrust bearings all enclosed in a sand cast aluminum case and cover.

Send For
Complete
Information

ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK

For more data circle 252 on Reader Service Card

modern machine shop 53

Now... Jarvis PIPE TAPS

WITH STANDARD HAND TAP SHANKS!



Here's the answer to the problems presented by conventional pipe taps! Exclusive Jarvis Pipe Taps with standard hand tap shanks easily fit any tapping machine or device—with never a chucking bottleneck. This addition to the dependable Jarvis line of standard taps affords new tapping versatility and precision.

Here's the big advantage of Jarvis taps with Standard Hand Tap Shanks—

	1/4"—18 NPT Standard Pipe Tap	1/4"—18 NPT New Jarvis Pipe Tap
Shank dia.	.5625	.480
Square size	.421	.360
Overall lgth.	2 7/16"	3 1/16"

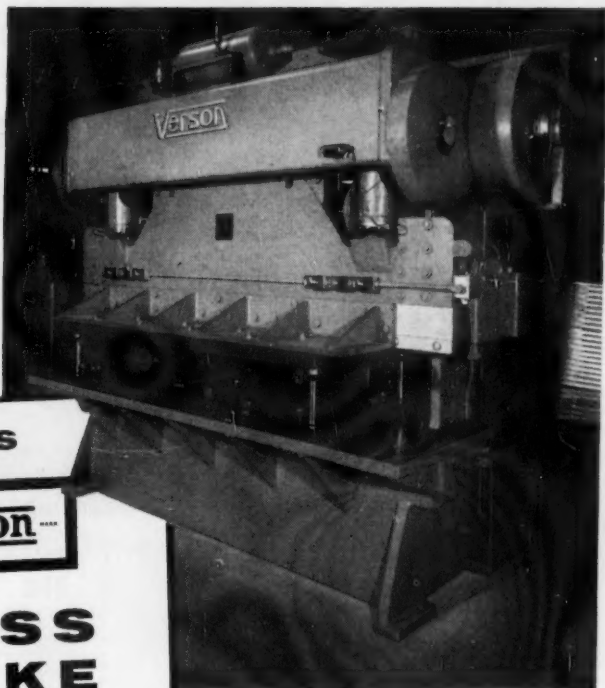
Three other sizes are stocked—1/8", 3/8", 1/2"—and all save man-hours, production dollars. A Jarvis representative is as near as your phone.

*Send Today
for Catalog!*

Complete manual with tap data and tips for better tapping is yours for the asking!



For more data circle 253 on Reader Service Card



THIS



**PRESS
BRAKE**

... combines

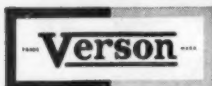
multiple production operations for TEMCO

This Verson Press Brake accomplishes in *one stroke* all the jobs that formerly required several operations. Temco, Inc., Nashville, Tenn., manufacturers of gas heating equipment, uses the Verson Model No. 308 Press Brake to gang punch and notch corners and holes in flat sheet steel parts . . . speeding

the complete production process and reducing overall cost of operation.

If you now use press brakes, or are doing jobs that could be adapted to a brake, it will pay to investigate the cost-cutting opportunities offered by Verson Press Brakes. Write for Catalog B-55.

A Verson Press for every job from 60 tons up.



ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

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MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

For more data circle 254 on Reader Service Card

June, 1956

modern machine shop 55

CLEEREMAN

DRILLING MACHINES

A battery of box column and round column Cleereman Drilling Machines on production work. One of many such installations producing at lower costs with higher production, less operator fatigue and no down time.



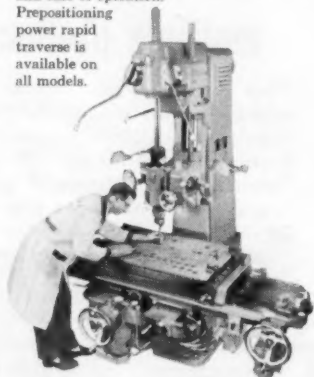
LAYOUT DRILLING MACHINE

A modern solution to an old problem. Built for those tool room and manufacturing jobs which do not require the ultra precision of Cleereman Jig Borers. The Cleereman Layout Machine is an economical machine capable of locating within .001" per foot and drilling, boring, reaming, tapping, etc., with utmost operator ease at a fast rate of production.



JIG BORER

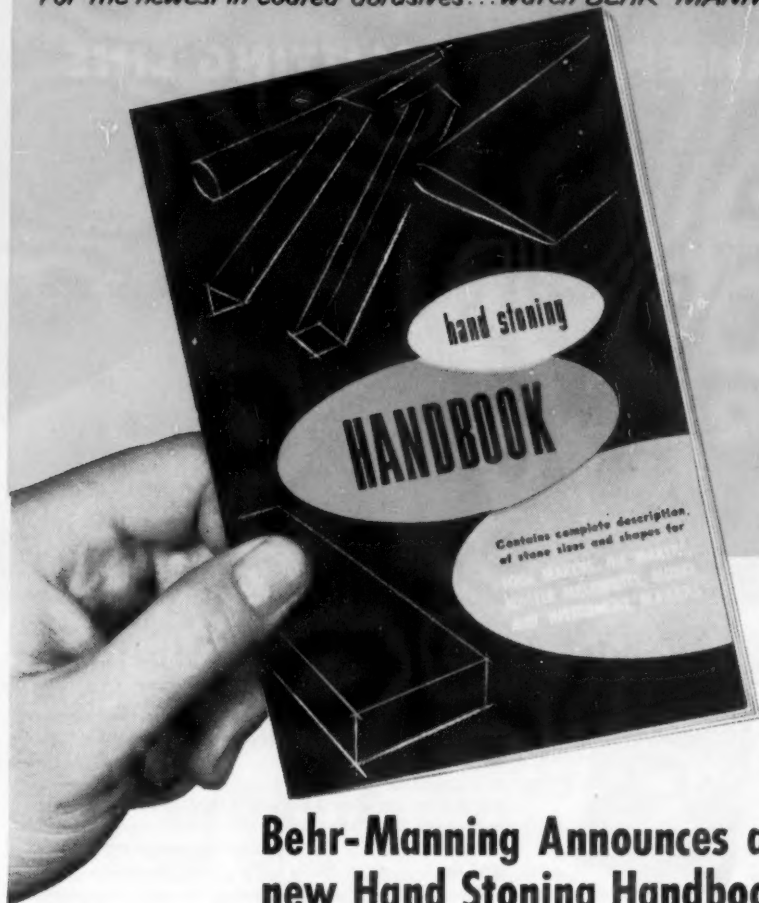
Unexcelled precision for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work and on "jigless" production. Combines stamina with precision and ease of operation. Prepositioning power rapid traverse is available on all models.



CLEEREMAN MACHINE TOOL CORP., Green Bay, Wis.

For more data circle 255 on Reader Service Card

For the newest in coated abrasives... watch BEHR-MANNING!



Behr-Manning Announces a new Hand Stoning Handbook

Here's 24 illustrated pages covering the many shapes and sizes available in the "World's largest line of oilstones." In addition, the booklet offers technical data on a variety of hand stoning operations. Write for your free copy today. Address Behr-Manning, Troy, N. Y., Dept. MS-6.



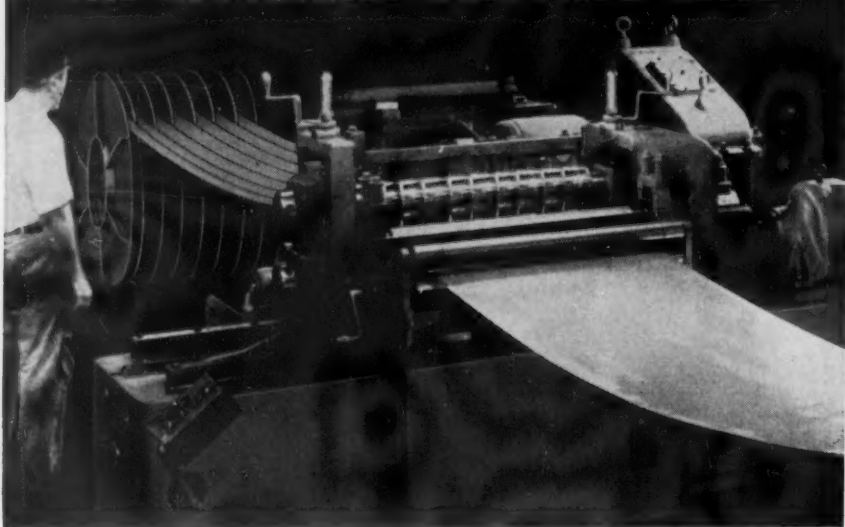
BEHR-MANNING

division of NORTON Company

- ▲ COATED ABRASIVES
- ▲ SHARPENING STONES
- ▲ PRESSURE-SENSITIVE TAPES

For more data circle 256 on Reader Service Card

AN EFFICIENT SLITTING LINE



...with big savings possibilities



The Yoder Slitter Book contains time studies, production records, and other valuable data on the economics as well as mechanics of slitter operation. A copy is yours for the asking; also estimates and recommendations.

The standardized series of Yoder Uncoilers, Slitters and Recoilers make possible an infinite number of combinations for highly efficient coil and sheet slitting.

At a substantial saving in first cost, one of these combinations will meet widely varying production needs of fabricating shops as efficiently as higher priced, built-to-order equipment (also designed and built by Yoder) for very big tonnage requirements.

A Yoder standardized slitting line is a most profitable production tool which will pay for itself in short order on strip requirements as low as 100 tons per month, even less. Equally important is the ability in a few hours to meet expected and unexpected needs for slit strands, from a relatively small stock of standard width coils. This greatly reduces strip inventories and simplifies production planning.

THE YODER COMPANY • 5532 Walworth Avenue, Cleveland 2, Ohio



**ROTARY SLITTING LINES
COLD ROLL FORMING MACHINES
ELECTRIC-WELD PIPE AND TUBE MILLS**

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Here's Your Best Assurance of

Higher Output
Better Accuracy
Reduced Costs

On Every Boring
and Facing
Operation



SOLID BLOCK
CUTTER



MULTI-CUTTER BLOCK
WITH EXPANDABLE
CUTTERS

With only two items to handle
—block and taper lock
screw—it takes but a few
seconds to insert a Davis block
in its bar and start boring.

MICROMETER-ADJUSTABLE
SINGLE-CUTTER
BLOCK

TWO-CUTTER
BLOCK WITH
EXPANDABLE
CUTTERS



*All 4 Block Styles Fit
into the Same Bar Slot*

**ONLY DAVIS
GIVES YOU ALL**

8 OF THESE ADVANTAGES

1. Block centers accurately in bar.
2. Full thrust transmitted to bar.
3. Readily adjusts to float boring.
4. Cutters rigidly locked in block.
5. Assure maximum range of bore sizes.
6. Blocks feature built-in centers.
7. Fore or back bore with one tool.
8. Quick, easy changing of blocks.

FOR COMPLETE INFORMATION,
WRITE FOR DAVIS CATALOG 304

Every boring job in your shop goes faster, more accurately and shows up far better on cost records when you standardize on Davis block tooling.

Truer bores result from exclusive design features and simplified, precision construction. The unique Davis double-piloted, taper lock screw is unequalled for accurate centering of block and transmission of full boring thrust to the bar slot. Rigidly supported and locked cutters assure higher accuracy on even heaviest cuts.

Faster, more economical boring results from the complete interchangeability of the Davis block line. Four basic block styles can be used in any particular bar slot—and changing blocks is simpler and faster than any other method. Bring your boring operations up to date—write now for complete information on how Davis Interchangeable Block Tooling can save you time, money and rejects.

DAVIS
BORING TOOL DIVISION OF
Giddings & Lewis Machine Tool Co.



Fond du Lac, Wisconsin

THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING

don't lose a day...

THE *HOTTEST* O.B.I.

without the spectacular facts

TOTALLY ENCLOSED...
BRAND NEW FROM THE GROUND UP

- Rugged, front-to-back crankshaft with huge crankpin
- Fully concealed, yet accessible, driving mechanism
- Enclosed, rigidly supported gearing operates in sealed oil bath
- Electro-pneumatic friction clutch on crankshaft
- Wider spaced, longer, narrower gibs
- Wider, box type slide all within gibbing
- Precision, hardened, longer-wearing gears
- Compact, straight-line, space-saving, all-steel frame

This is it! The most talked about press in the world! The press that captured the hearts of the entire industry at the Machine Tool Show! The press that was born to do more than any O.B.I. ever built!

Get the spectacular facts and figures on this metalworking marvel... the all-new Niagara Series E, Front-to-Back Crankshaft Inclinable. It outmodes everything within its range (75 to 200 ton capacities, 4 1/2 to 7 1/2 inch shaft diameters, standard and automated models).

PRESS IN HISTORY!

just send this...

STUDDED WITH SCORES OF
TECHNICAL IMPROVEMENTS

- No overhanging gears, flywheel and other mechanisms
- No damaging crankshaft deflection
- Full support to wide dies — no overhang on slide
- Greater resistance to off-center loading
- Accurate alignment of slide, with minimized tendency to cock
- Substantially increased die life
- Smoother, safer press performance — simpler, thriftier servicing
- Less floorspace required

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.Y.

Please rush new Bulletin 56 with all the facts on your brand new Series E Inclinable.

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STREET _____
CITY _____ ZONE _____ STATE _____
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to get this...

26 FACT-FILLED PAGES



NIAGARA

front-to-back crankshaft INCLINABLE PRESSES

America's Most Complete Line of Presses, Shears, Press Brakes, Other Machines and Tools for Plate and Sheet Metal Work.

Tough grinding jobs?

Check **Vulcanaire**

high speed precision grinding heads!

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

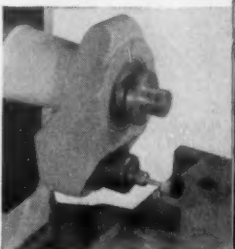
Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.



Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.



Vertical adaptor for Surface Grinders. Grinding small slots



Horizontal application Grinding a Shoulder Punch.

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

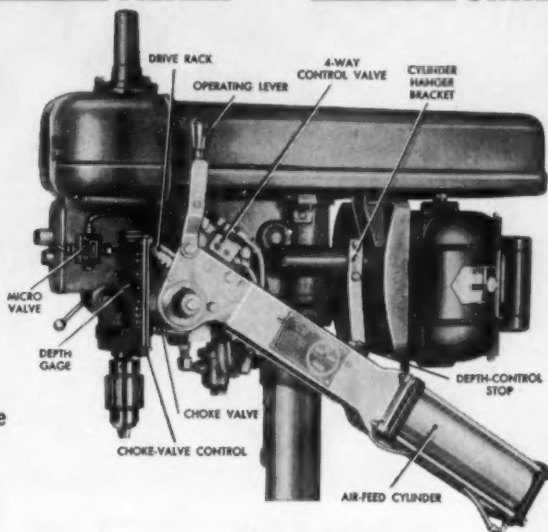
VULCAN TOOL CO.

710 LORAIN, DAYTON 10, OHIO

WALKER-TURNER

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this new
time-saving,
money-saving
Air Feed
in 10 minutes!**

Send for new, **FREE** 24-page
manual on application of
Air Feed to Drill Presses!



100% PNEUMATIC! NO ELECTRICAL CONNECTIONS! NO MACHINING! Converts any Walker-Turner, or W-T type, Drill Press up to 1" capacity to a high production power-fed drilling machine. Gives sensitive, automatic feed control for a wide variety of production operations in metal or wood. . . . Air Feed Attachment for 15" and 20" Drill

Presses, 4" and 6" spindle travel; prices start at \$236. Air Feed-equipped Walker-Turner 15" and 20" Drill Presses, 4" and 6" spindle travel; prices start at \$413.50. . . Ask your Walker-Turner Distributor to *demonstrate*. He's listed under "Tools" in your phone book's Yellow Pages. Or write for his name and new, *free* Manual.

DRILL PRESSES, HAND AND POWER FEED — AIR FEED DRILL PRESS ATTACHMENT —
RADIAL DRILLS — WOOD AND METAL CUTTING BAND SAWS — TILTING ARBOR SAWS —
RADIAL SAWS — JIG SAWS — CUT-OFF SAWS — LATHES — SPINDLE SHAPERS —
JOINTERS — BELT AND DISC SURFACERS — FLEXIBLE SHAFT MACHINES



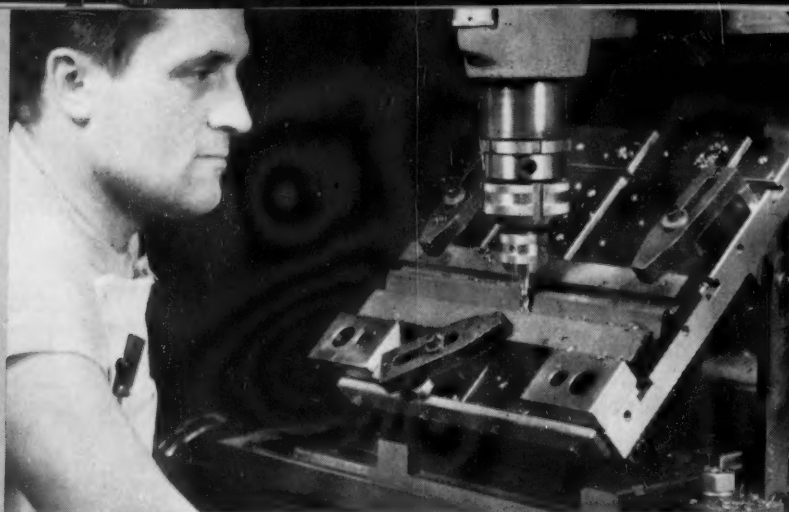
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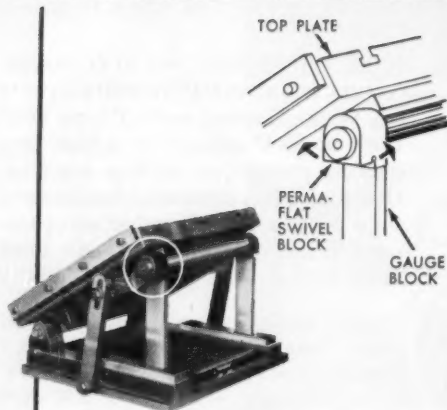
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OW! *First Major Change in Sine Plate Design in 20 Years!*

This exclusive, patented new feature in Robbins Sine Plate design means savings for every tool room! You'll save wear on sine bar rolls and costly gauge blocks, too, with the Robbins "PERMA-FLAT" swivel block, now found on every heavy duty sine plate we manufacture. The PERMA-FLAT swivel block distributes weight evenly over a large area of the gauge blocks on which it rests, rather than with the single line contact obtained using conventional sine bar rolls. Write for complete information on how Robbins Sine Plates save time and add accuracy on all angular machining and inspection set-ups.



Robbins Sine Plates make possible any angular set-up for machining or inspection to gauge block accuracy. Immediate delivery on 12", 24"—36" and 48" square models to order.

OMER E.

Robbins

COMPANY

24800 PLYMOUTH ROAD

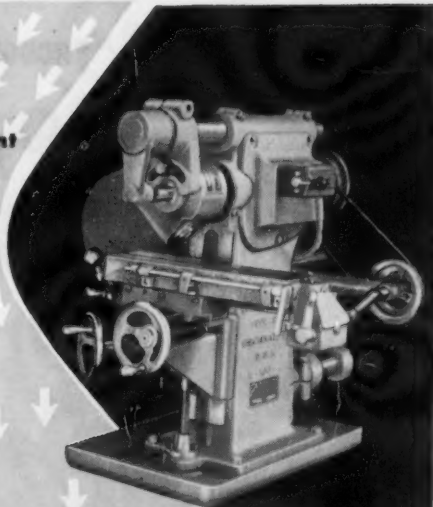
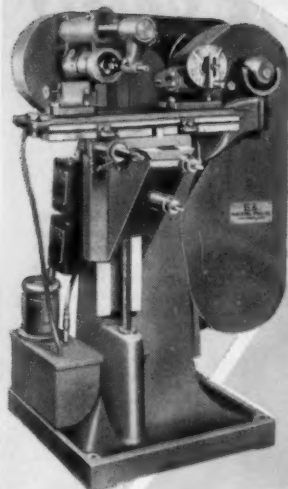
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DETROIT 39, MICH.

Also producers of special machinery, gages and fixtures

**Small parts bottlenecks
strangling your
milling department**

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MILLING MACHINES

Free Big Mills for Big Jobs!

No. 1 U. S. MILLING MACHINE

The top-quality, precision mill, economically priced! Hand operation, or air-hydraulic feed for high production.

Accurate and simple-to-operate, brings small part production into balance, avoids wasted time and investment in big mills.

Excellent for keyways, quantity runs of sectors, short racks, simple profiling, sawing, slotting, squaring, cut-off, short-run splining, even light slab milling.

BURKE BENCH MILLERS

Small part milling accuracy for toolroom or production uses . . . 2 hand and 2 power feed models.

Rugged frame, hand scraped thru-out, Timken bearings . . . time-tested design for accurate milling, drilling, sawing, boring, facing and slotting of small parts.

Wide range of speeds. Dependable performance and ease of set-up lower operational costs. Vertical Milling Attachment and complete range of other accessories.

Write for complete specifications and prices

U * S * Burke

MACHINE TOOL DIVISION

3 Brotherton Road • Cincinnati 27, Ohio

Manufacturers of the U. S. Vertical Milling Machine and the radically new U. S. Quartet

For more data circle 264 on Reader Service Card



"RODGERS PLATEN PRESS GIVES US

FAST CYCLING
WITH
COMPLETE SAFETY"

—SAYS VEIT AND YOUNG

Rodgers 400-ton platen press in use at Veit and Young, Huntingdon Valley, Pa., metalworking specialists. The press is equipped with die cushion, fast cycling cylinders and other accessories. Some of the products formed are stacked by the press.

Production has been increased in drawing and forming large serving trays and electrical panels by Veit and Young with their Rodgers Platen Press. Safety controls permit operators to concentrate on speed and accuracy. They are working type 303 stainless steel, brass, carbon steel, aluminum—from $\frac{1}{16}$ " to $\frac{1}{8}$ " thick with bends up to 90°.

Auxiliary cylinders lower and

raise platen quickly for fast cycling. Forming pressures are preset from 80 to 400 tons—die cushion up to 50 tons. Simple, fast adjustments govern all platen, pressure and time cycles. If you work in metal, plastic, rubber, veneers—you can mold, draw, form—faster with a Rodgers Platen Press. Capacities 10 to 600 tons. Send for Rodgers "Blue Ribbon" Platen Press Catalog.

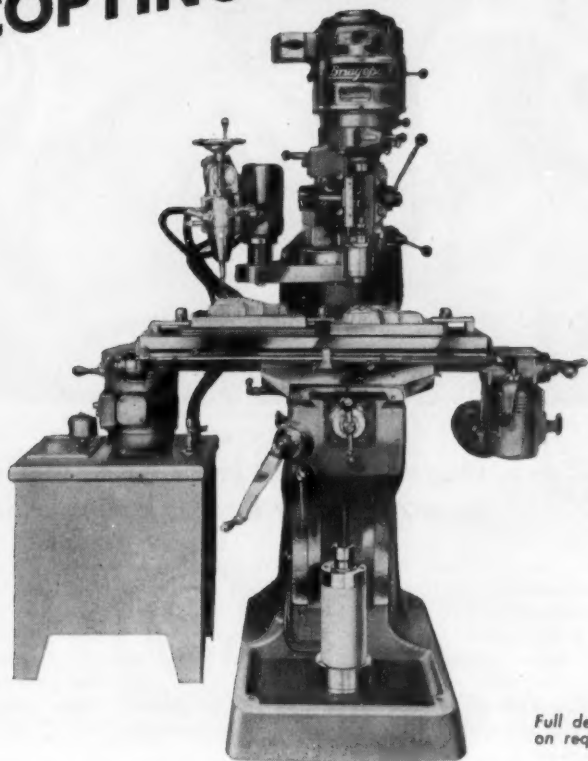


Rodgers Hydraulic Inc.

7447 WALKER STREET • MINNEAPOLIS 26, MINN.

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Do you need **COPYING EQUIPMENT?**



Full details
on request.

The Bridgeport True Trace combination will give excellent performance and save endless hours when copying irregular dies and moulds.

The stylus mounting fits between the column and the turret and is suitable for either right hand or left hand installation on new or old machines.

The stylus assembly swings out of the way so there is no interference when machine is used for conventional milling.

***Bridgeport* MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

For more data circle 266 on Reader Service Card



Here's why Blanchard Wheels are best for Blanchard grinding

Almost thirty years ago, Blanchard began developing and manufacturing better grinding wheels for Blanchard Surface Grinders. Our research first produced silicate bonded wheels, and then resinoid bonded wheels.

Today, Blanchard offers silicate, resinoid and vitrified bonded wheels . . . scientifically manufactured and accurately graded in our modern wheel plant.

Use Blanchard Wheels on your Blanchard Grinders. The correct wheel gives you peak production and economy on each job . . . whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.

PUT IT ON THE **BLANCHARD**

THE BLANCHARD MACHINE COMPANY

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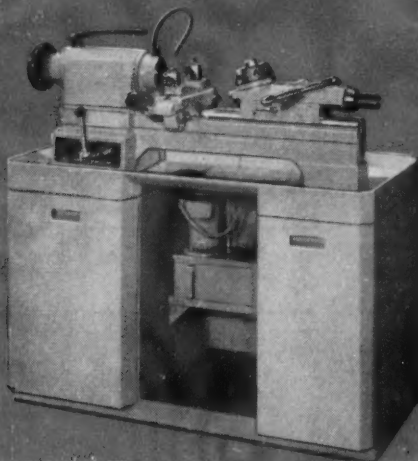
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a **challenge** to the rated capacity
of your present hand turret lathes!

Compare
your present

1. output
2. tolerances
3. set-up time
4. rejects



with a new **RIVETT 918ST** — and get the startling
proof of how much you can increase output per machine per manhour!

**Evidence from RIVETT
customers shows that—**

1. Instant Start-Stop of Spindle Doubles Output (even on short runs of varied pieces)
2. Tolerances—Measured in "Tenths" (on all types of work)
3. Simplified Tooling Cuts Set-up Time in Half!
4. Rejects—NEXT TO NOTHING

Rivett Features Less Labor Per Piece

• Write for Bulletin
918STB and See!



RIVETT LATHE & GRINDER, INC., Dept. MMR6, Brighton 35, Boston, Mass.



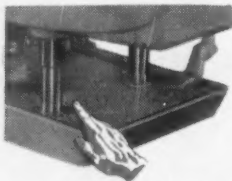
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New! Kearney & Trecker's "Bull's-Eye" Control Grouping



Available
under
Tool-Lease
program

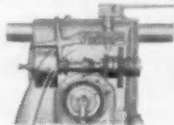
A few more of many reasons why **TF** Series
milling machines are so easy to operate



Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of machines' much wider, heavier knee, saddle and table. This balanced design substantially increases stability under heaviest loads . . . offers greater resistance to torsional thrust under all cuts . . . assures greater, longer-lasting accuracy.



Heavier, Wider Knee — Twin Screws support the one-piece, larger knee. Span and length of ways is increased considerably, providing greater saddle support . . . longer-lasting accuracy . . . reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life . . . quieter, vibrationless operation.

TF Series milling machine's controls are grouped up-front for "bull's-eye" accuracy . . . measurably reduce operator fatigue

One look tells why the new TF Series milling machines — Plain, Universal and Vertical — are so easy to operate. "Bull's-eye" up-front control grouping permits operators to achieve exact settings faster, more adeptly and with greater ease than ever before. This "Fron-Trol" convenience is the key to low-cost production . . . because it increases the operator's efficiency and measurably reduces fatigue through elimination of wasted steps.

The "bull's-eye" knee and saddle-mounted controls are safety-interlocked and include feed selection, directional Mono-Lever table feed and rapid traverse, automatic cycle table feed and rapid traverse controls, front-mounted table handwheel, saddle clamping gib and backlash eliminator, and hand and power directional controls for knee and saddle movements.

New TF's are built in five sizes — No. 2 to No. 6 from 10hp to 50hp. You can get all the facts on TF Series machines from your Kearney & Trecker representative — or write direct to Kearney & Trecker Corp., 6794 W. National Ave., Milwaukee 14, Wis. Ask for Catalog No. TF-50.



Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine inspection.

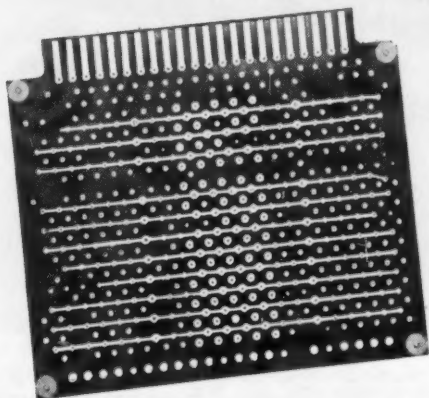
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TRACER-GUIDED DRILLING

100 HOLES P. M.

WITH NEW HERMES *Engravo*graph

for printed circuit plates



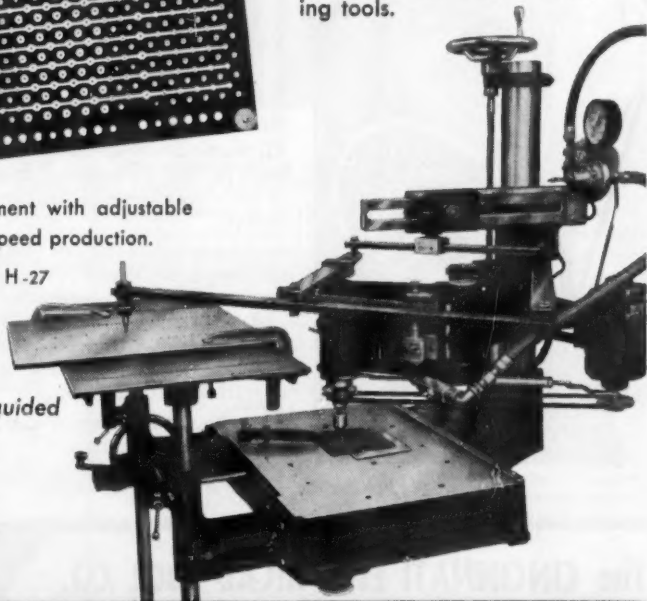
Pneumatic attachment with adjustable feed gives high speed production.

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Also for tracer-guided
ENGRAVING
PROFILING
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- Pantograph reproduces drill pattern from template in any reduction ratio — assuring high accuracy.

- Allows drilling and routing of different size holes in one operation without changing tools.



new hermes ENGRAVING MACHINE CORP.

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Time for an **AIR MASTER**



Yes, it's **TF/AM***

... **TIME FOR AN AIR MASTER** when "sandpaper-air" drips enough dust on benches and equipment to attract a doodler.

Air borne and collecting dust can reduce equipment to "dirt cheapness." It can injure the health of your employees. Dust can and does cost you money.

If you grind, buff and polish, you need *The Cincinnati Air Master* . . . for new equipment, and for that already in operation. Closely woven fabric and steel wool filters "wash" aggravating dust and grit laden air. Grinder or buffer switch starts or stops *Air Master* simultaneously. Compact, quiet operation; easy to clean.

We also manufacture a complete line of Drills, Grinders and Buffers.

For details, write for catalog 56 XA.

The CINCINNATI ELECTRICAL TOOL CO.

Division of The R. K. LeBlond Machine Tool Co.

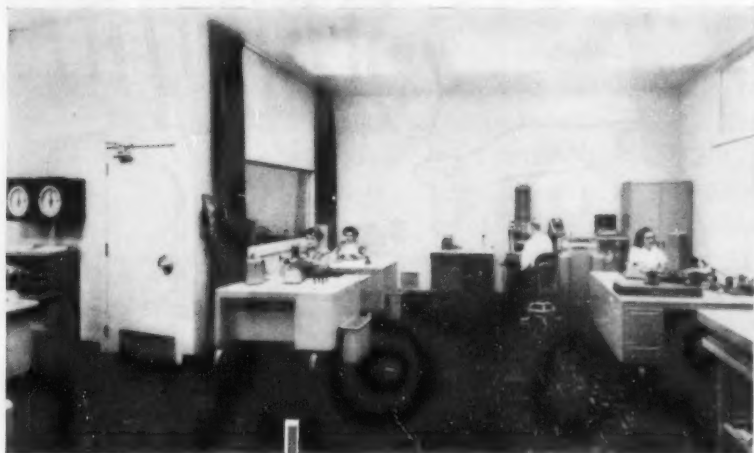
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THE ELI WHITNEY METROLOGY LABORATORY

**Your NEW Auditing Source
For Dimensional Standards**



For a more comprehensive account of the facilities and capabilities of the Eli Whitney Metrology Laboratory, request Bulletin ML-1-56 from The Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 12.

American industry now has a new auditing source for dimensional standards at all precision levels.

In a maximum controlled environment—using instruments similar to those of the leading national standards laboratories of the world, the Eli Whitney Metrology Laboratory offers the following services:

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- Dimensions of gage blocks, mechanical components and fixed size master gages including thread gages and threaded parts.
- Flatness and surface finish of optical true planes.
- Material hardness.
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- Boundaries of contoured masters.

- ## 2 Provide a counseling service
- for the development of industrial dimensional control and gage surveillance programs.



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manufacture and measurement for mankind

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If your sawing costs are mounting because you're not getting consistent low-cost operation, maximum production, and minimum downtime, call your Victor Distributor. He's the man who can bring your costs down to eye level. Once he's listened to your troubles, he'll recommend the *right* Victor Hand and Power Hacksaws, Metal and Wood Cutting Band Saws, and Hacksaw Frames for all your needs.

Your Victor Distributor will especially want to tell you about Victor "Moly"[®] High Speed steel blades. He'll tell you that "Moly" blades can save you real money because they outlast standard steel blades 10 to 1, cut as well as the *best* high speed steel blades made, and yet are substantially lower in cost!

And be sure to ask your Victor Distributor for a supply of our NEW Metal Cutting Booklets and Wall Charts. They're packed full of interesting information.

Sold Only Through Recognized Distributors

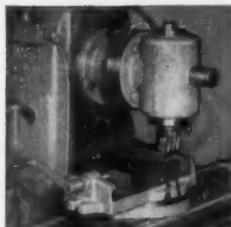
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SAW WORKS, INC. • MIDDLETOWN, N. Y., U. S. A.

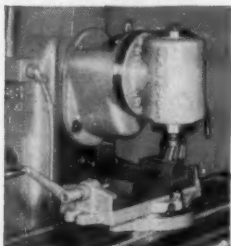
MAKERS OF HAND AND POWER HACKSAW BLADES, FRAMES,
AND METAL AND WOOD CUTTING BAND SAW BLADES

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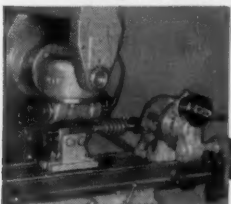
1890



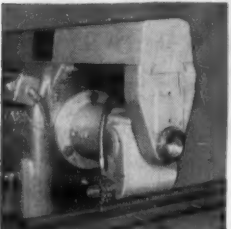
Heavy Duty Vertical
Milling Attachment



Heavy Duty Offset
Vertical Milling Attachment



Universal Milling Attachment



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**Heavy duty attachments
increase versatility
of dependable, low-cost**

GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS.

Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



Extra size table
with 34" travel optional
at extra cost.

GREAVES MACHINE TOOL CO.
2700 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.
Send information on Attachments and Accessories for GREAVES MILLS.

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FREE Comparison
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descriptive literature,
on easy-to-use
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ELEVATING WORK TABLE

for FAST, SAFE, handling of dies



**A strong,
husky,
die table with
big overload
safety factor**

2000 lb. capacity

**Only
\$215⁰⁰**

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**This "one man"
die handler
belongs in every
machine shop**

GREATER LIFTING RANGE

24" minimum to 42" maximum height. Wheels under base frame — you can get up tight against press or rack.

Four crank studs — two at each end of table for high and low speed adjustment.

Roller bearings in wheels and casters for easy moving.

Floor lock holds table securely when moving DIES on and off.

Dimensions 24" by 36". Use it for small, medium and large dies.


Available from your local supplier or write Don Suhr.

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Makers of Die Handling equipment Since 1901

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Brand New!

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haskAIR Grinder...

**most powerful
air turbine grinder
in its class!**

75,000
R.P.M.
(1/5 H.P. prony brake test)



- Permanently sealed bearings . . . never needs lubrication in air lines or grinder.
- Removable nose piece for deep grinding.
- Gyro action of turbine holds tool steady.

Here's power—SUSTAINED POWER—like you've never experienced before in an air grinder . . . power unexceeded by any other air grinder in the same price range . . . maintains its high-speed efficiency under load! Built with a lightweight, contoured, hand-fitting aluminum housing, the Haskins haskAIR Grinder handles easily, balances perfectly . . . excellent for the most precise grinding job. Complete kit includes: carrying case, adapter hose, mounted points, dressing stone and wrenches.

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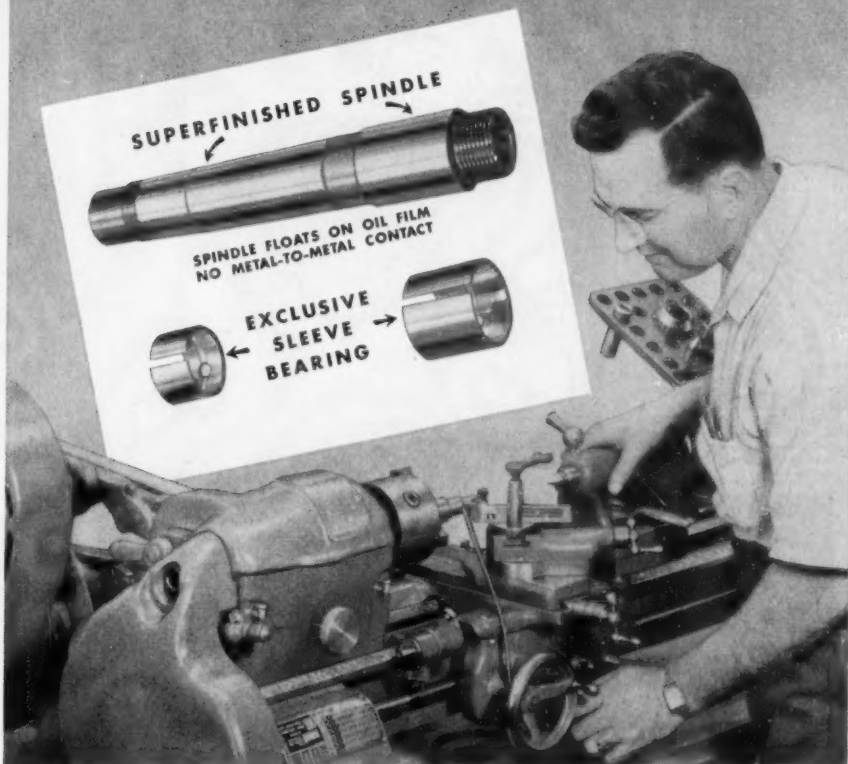
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THE ONLY 10" LATHE WITH
SUPER-ACCURATE
SPINDLES



LIGHT TEN PRECISION TOOLROOM BENCH LATHE—BASE PRICE \$731

GREATER ACCURACY! SMOOTHER FINISHES! No other spindle design can give you the performance that you get in South Bend Lathes. Hardened and ground spindle surfaces are superfinished to 5 microinches and bronze sleeve bearings are burnished to 10 microinches. A circulating capillary oiling system maintains a film of clean filtered oil preventing metal-to-metal contact between the rotating spindle and bearings. With this construction there is less spindle run-out—no bearing vibration to cause chatter marks—superior spindle support. This is why you get better results with South Bend Lathes. Write for catalog.



SOUTH BEND LATHE • SOUTH BEND 22, INDIANA

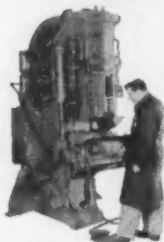
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June, 1956

modern machine shop 79

COST-CUTTING SOLUTIONS

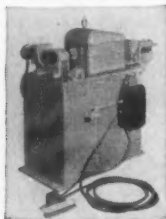
FOR FABRICATORS OF
TUBING, PIPE, MOLDINGS
AND EXTRUDED SHAPES



PINES 20-TON BENDING PRESS—Speeds production of automotive tail pipes, completes some jobs 50% faster by eliminating work handling. Up to 10 bends produced in a single progressive operation, most jobs completed in one handling.



PINES SEMI-AUTOMATIC BENDER—Capacity up to 300 bends per hour, for applications where output does not require speed of fully automatic machines. Hydraulic power assures accurate, highly uniform results. Economically built, easy for women to operate, requires up to 60% less floor space.



PINES END-FINISHING MACHINE—3" capacity, floor-mounted unit with air clamping. Speeds deburring, facing, pointing, or light hollow mill turning. Available with manual or air spindle advance. Other units also provided for smaller and larger work.



PINES SIZE 4 BENDER—Now cold forms ultra-thin 4" x .020" stainless steel tubes for aircraft to 8" c/i radius. Ability to form these sharp, small radius bends without wrinkles saved \$14,000 per plane for an aircraft manufacturer.

● Since 1941, when Pines Automatic Hydraulic Bending Machines were first introduced, more and more plants fabricating tubing, pipe, rods, moldings, rolled and extruded shapes, have found it profitable to standardize on Pines Machines. Dependable accuracy, combined with fast, more efficient operation are two of the major reasons why hundreds of commercial and industrial plants have turned to Pines to find cost-cutting solutions to bending and end-finishing problems. A study of the four examples shown here may suggest how you may profitably take advantage of the latest developments in fabricating the "Pines-way".

WRITE FOR Free DATA SHEETS

For additional cost-cutting ideas, write today for free copies of "Pines News"—illustrates latest bending and end-finishing techniques applied to actual jobs. And call on Pines engineers for assistance on any job.

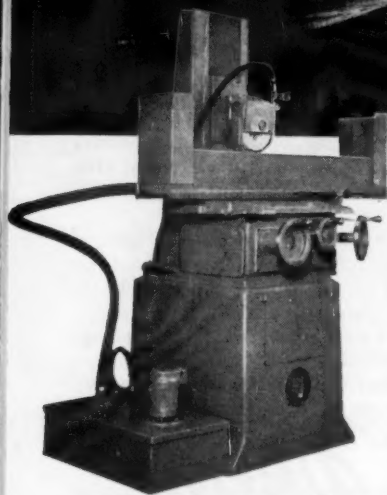
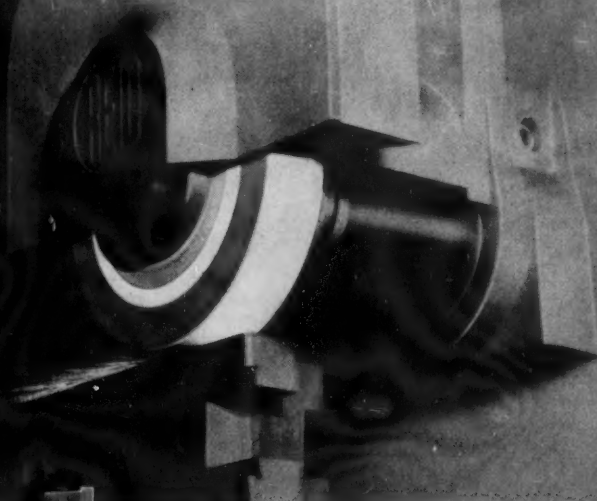


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Specialists in Tube Fabricating Machinery 642 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINES

For more data circle 279 on Reader Service Card

REID sets the standard for precision surface grinding...



MODEL 618H convenient finger-tip level controls for all operations make this grinder the favorite of the toolroom for the finest tool and die grinding. Accessories, including Cool-Grind or wet grinding attachments, magnetic chucks and form dressers give extreme versatility for all operations.

MODEL 618VL designed for precision grinding to the finest tolerances with superior surface finish . . . rugged construction and painstaking finishing give true dependability for continuous operation with minimum maintenance. Features power feed table with traverse speed variable from 12 to 35 feet per minute.

*Photo courtesy of
Robertson Mfg. Co.*

SPECIFICATIONS

CAPACITY: 6" wide, 18" long, 17 $\frac{1}{4}$ " high from spindle center to table.

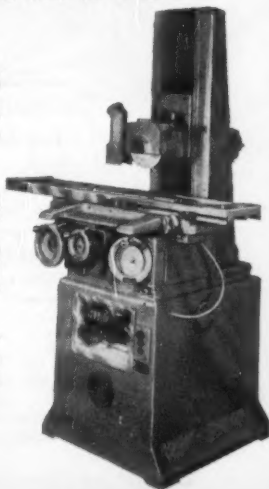
WORKTABLE: 51" x 8" overall.

FEED RANGE: Elevating hand wheel (r.) graduated to .0005" (optional, vernier to .0001"); cross feed to .001"; power cross feed adjustable .006" to .100" at either or both ends of table reverse.

GRINDING HEAD: with 3" opening for standard 1 h.p. cartridge type motorized spindle. Wheel size: 7" x 1 $\frac{1}{2}$ " x 1 $\frac{1}{4}$ ".

FLOOR SPACE: 71" x 43 $\frac{1}{2}$ ".

WEIGHT: 2100 lbs. net.



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Reid Brothers



Company, Inc.

BEVERLY

MASSACHUSETTS

Abrasive Cutting

*the best way to cut many materials
the only way to cut some*

Allison Cut-Off Wheels



**Wide variety of shapes
and materials
cut with abrasive wheels**

• Speed and quality of cut make abrasive cutting ideal for a wide range of operations. For example: one inch cold rolled steel can be cut with a wheel cost of under ½ cent per cut and in 3 seconds.

ALLISON Cut-Off Wheels can provide smooth, high-quality cutting for almost any type of material however hard. These include steels of practically all analyses including corrosion-resisting types, brass, bronze, Monel Metal and other non-ferrous; aluminum alloy, magnesium and many others.

Whatever the problem there is an ALLISON Abrasive Wheel to meet it. Rubber bonded wheels give long wheel life and smooth, fine-finish cuts for wet cutting. Resinoid bonded wheels are best for dry cutting when quality requirements are less exacting.

Consult a specialist for best results

Are you getting the most from your cutting methods? Abrasive cutting methods, properly done, can be 10 to 20 times as fast as metal sawing. Let an ALLISON abrasive cutting specialist check your hardest cutting job.

Allison
ABRASIVE CUTTING WHEELS

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"ABRASIVE
CUTTING"
Today



ACCO

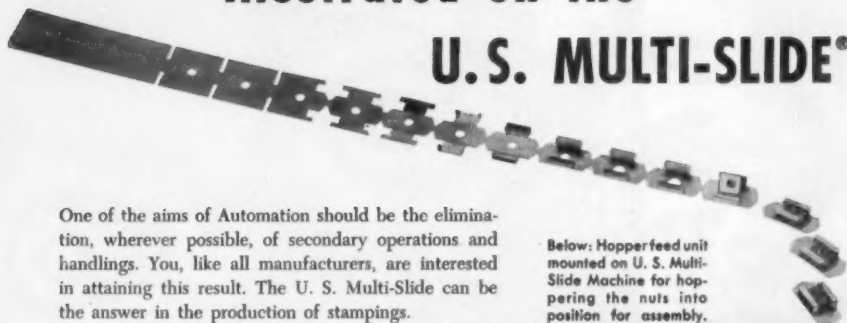


ALLISON DIVISION AMERICAN CHAIN & CABLE

254D Island Brook Avenue, Bridgeport 2, Conn.

For more data circle 281 on Reader Service Card

Automation in Stamping Production Illustrated on the U.S. MULTI-SLIDE®



One of the aims of Automation should be the elimination, wherever possible, of secondary operations and handlings. You, like all manufacturers, are interested in attaining this result. The U. S. Multi-Slide can be the answer in the production of stampings.

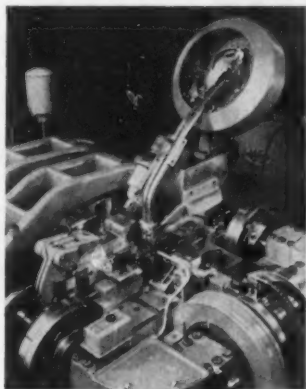
The sequence-of-operations strip pictured above shows how a complete assembly is produced on the U. S. Multi-Slide without secondary operations. The finished assembly is an automotive fastener comprised of a sheet metal stamping and a nut. The stamping is produced on the U. S. Multi-Slide and the prefabricated nut is hopper-fed into proper position for automatic assembly. The complete unit is produced at the rate of 100 per minute — without handling.

The elimination of secondary operations results in reduced cost per piece, an all-important factor in today's competitive market. If you produce stampings and are interested in low piece part costs, why not investigate the use of U. S. Multi-Slide Machines?

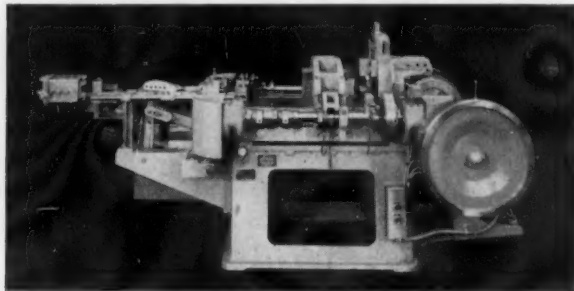
**Ask for Bulletin 15-S
giving complete specifications**

U.S. TOOL COMPANY, Inc.

**AMPERE (East Orange)
NEW JERSEY**



Below: Hopper feed unit mounted on U. S. Multi-Slide Machine for hoppering the nuts into position for assembly.



Builders of U.S. Multi-Slides
U.S. Multi-Millers
U.S. Automatic Press Room
Equipment
U.S. Die Sets and Accessories

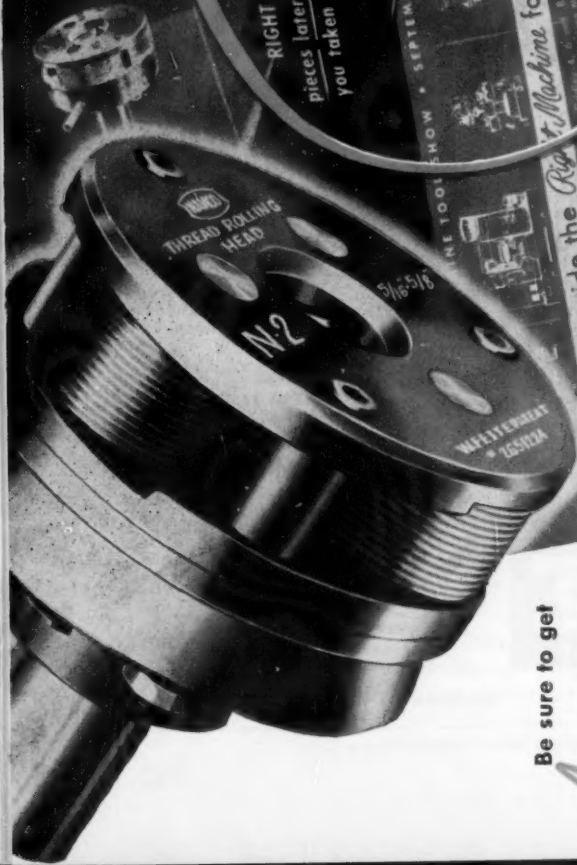
Left: Standard No. 33
U. S. Multi-Slide Machine on which the hopper feed unit is installed.

For more data circle 282 on Reader Service Card

PERFORMANCE **FIGURES** **WITH**
Acme-FETTE



Be sure to get
Acme-FETTE
figures on your
threading jobs



RIGHT ON SCHEDULE! 4 months and another 1,000,000 pieces later, the original set of rolls are still on the job. Have you taken a close look at your threading picture lately?

THE TOOL SHOW • SEPTEMBER

THE NATIONAL
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OUR JOB: to provide the *Right Machine* for YOUR JOB

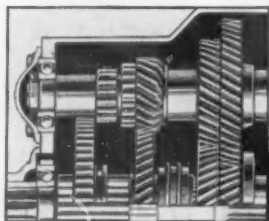
THREADING COSTS NOW DOWN
TO \$0.00005 PER PIECE

National Acme

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SALES OFFICES: • Newark 2, New Jersey • Chicago 6, Illinois • Detroit 27, Michigan

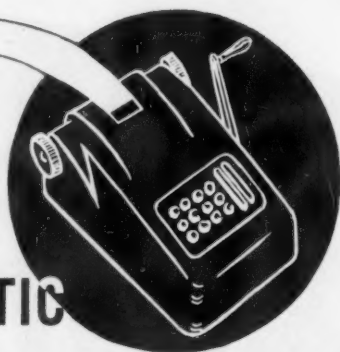
GREATER



Macco 472 at both ends positively eliminates the major complaint against using soluble coolants in automatics—the leakage of lubricating oil into coolant sump, and vice versa, causing rust in gear boxes.

AUTOMATIC

PRODUCTION



to use
MACCO 472
at both ends of your
AUTOMATICS

For years, leading manufacturers everywhere have been using Macco 472 emulsified oil as both a gear box lubricant and a cutting coolant. Almost without exception, they report sharply increased production and reduced costs.

You, too, will enjoy important benefits by using Macco 472 at both ends: Longer tool life—Increased spindle speeds and cutting feeds—Cooler operation—Inspection of parts without cleaning—Elimination of chip spinning and oil salvage—Up to 90% reduction in cleaning costs—Reduction of fire hazards and lower insurance premiums—General good house-keeping and a cleaner and more satisfied personnel.

Only a soluble cutting lubricant with the characteristics of Macco 472 should be so used. A minimum of 4000 lbs. per square inch of film strength at a 15 to 1 emulsion, with very little detergency, is required and the emulsion must be stable in every respect.



Macco 472 enables you to grind tools without the sharply defined chip breakers required with oils, due to the elimination of the hot or plastic chip. With the proper amount of coolant, the chip becomes brittle and breaks more easily, assuring longer tool wear. Cratering and breakage are minimized.

•
**For rust-proofing,
investigate
Macco Blucoat or
Macco Anti-Rust**
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*To work out this problem, write us
or call a Macco Sales Engineer.*

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HIDDEN COSTS
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Flat Ground Die Steel
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IMMEDIATE DELIVERY
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STOCK SIZES

Width	Thickness	Weight	Length	Area	Volume
1/2"	1/8"	0.0044	12"	0.0053	0.000063
1/2"	3/16"	0.0066	12"	0.0079	0.000095
1/2"	1/4"	0.0088	12"	0.0106	0.000127
1/2"	5/16"	0.0110	12"	0.0133	0.000159
1/2"	3/8"	0.0132	12"	0.0160	0.000191
1/2"	7/16"	0.0154	12"	0.0187	0.000223
1/2"	1/2"	0.0176	12"	0.0214	0.000255
1/2"	9/16"	0.0198	12"	0.0241	0.000287
1/2"	5/8"	0.0220	12"	0.0268	0.000319
1/2"	3/4"	0.0242	12"	0.0295	0.000351
1/2"	7/8"	0.0264	12"	0.0322	0.000383
1/2"	1"	0.0286	12"	0.0349	0.000415
5/8"	1/8"	0.0066	12"	0.0079	0.000095
5/8"	3/16"	0.0099	12"	0.0119	0.000143
5/8"	1/4"	0.0132	12"	0.0158	0.000191
5/8"	5/16"	0.0165	12"	0.0198	0.000239
5/8"	3/8"	0.0198	12"	0.0237	0.000287
5/8"	7/16"	0.0231	12"	0.0277	0.000335
5/8"	1/2"	0.0264	12"	0.0316	0.000383
5/8"	9/16"	0.0297	12"	0.0356	0.000431
5/8"	5/8"	0.0330	12"	0.0395	0.000479
5/8"	3/4"	0.0363	12"	0.0435	0.000527
5/8"	7/8"	0.0396	12"	0.0474	0.000575
5/8"	1"	0.0429	12"	0.0514	0.000623
3/4"	1/8"	0.0088	12"	0.0106	0.000127
3/4"	3/16"	0.0132	12"	0.0158	0.000191
3/4"	1/4"	0.0176	12"	0.0214	0.000255
3/4"	5/16"	0.0220	12"	0.0268	0.000319
3/4"	3/8"	0.0264	12"	0.0316	0.000383
3/4"	7/16"	0.0308	12"	0.0364	0.000447
3/4"	1/2"	0.0352	12"	0.0412	0.000511
3/4"	9/16"	0.0396	12"	0.0460	0.000575
3/4"	5/8"	0.0440	12"	0.0508	0.000639
3/4"	3/4"	0.0484	12"	0.0556	0.000703
3/4"	7/8"	0.0528	12"	0.0604	0.000767
3/4"	1"	0.0572	12"	0.0652	0.000831
1"	1/8"	0.0110	12"	0.0133	0.000159
1"	3/16"	0.0165	12"	0.0198	0.000239
1"	1/4"	0.0220	12"	0.0268	0.000319
1"	5/16"	0.0274	12"	0.0333	0.000399
1"	3/8"	0.0329	12"	0.0398	0.000479
1"	7/16"	0.0383	12"	0.0463	0.000559
1"	1/2"	0.0438	12"	0.0528	0.000639
1"	9/16"	0.0492	12"	0.0593	0.000719
1"	5/8"	0.0547	12"	0.0658	0.000799
1"	3/4"	0.0601	12"	0.0723	0.000879
1"	7/8"	0.0656	12"	0.0788	0.000959
1"	1"	0.0710	12"	0.0853	0.001039

Ask your Simonds Distributor for a copy of this New Chart (18" x 21") giving full range of Stock Sizes now available.

First cost is only part of the story when figuring die steel costs. Bar for bar you save with Simonds. Simonds Flat Ground Die Steel requires no costly grinding to size. It's already precision ground to 1001 stock sizes. What's more it's uniformly annealed and readily machinable. You save on time. You get better results... have a choice of OIL Hardening or AIR Hardening type.



Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que. Simonds Divisions: Simonds Steel Mill, Indianapolis, N. Y.; Ball's Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Phila., Pa.; and Arvida, Que., Canada.

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For Fast Service
from
Complete Stocks

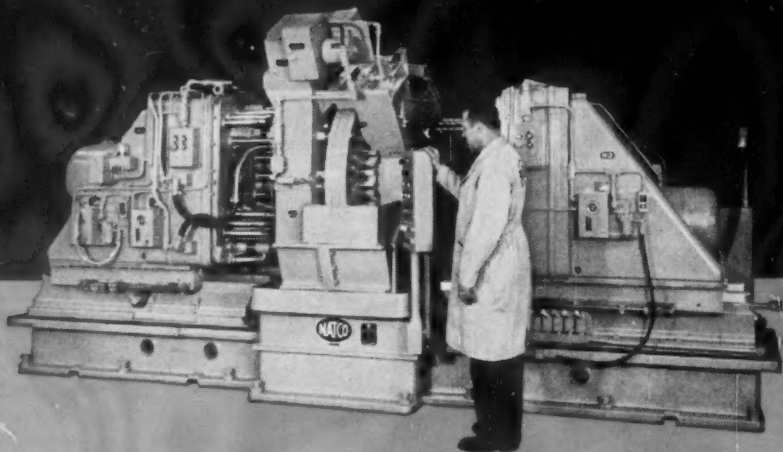


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New Natco[®]

Performs 17 Operations

Every 15 Seconds



Performance—this

Natco 2-way horizontal drilling machine produces 250 steering knuckles per hour. Holds limits as close as .004". Parts are clamped automatically in the interlocked trunnion fixture—spot-drilled, drilled, spotfaced, reamed and counterbored.

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Richmond, Indiana



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*Multiple-spindle drilling, boring, facing and tapping machines
Special machines for automatic production*

GET TRIPLE ACTION

IMMUNOL

REG. U.S. PAT. OFF.

THE SOLVENT

That Does MORE Jobs For You!

IMMUNOL cleans, degreases and rustproofs ferrous metals in one fast, easy operation . . . is low in cost, non-toxic, non-flammable

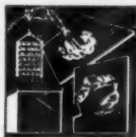
. . . And ELIMINATES FLAMMABLE SOLVENTS

ONE GALLON OF IMMUNOL MAKES 33 GALLONS OF SOLVENT

It mixes with hot or cold, hard or soft water and can be applied by any method now in common use. It can be used over and over again. Foreign matter is floated to the surface where it is easily removed.



IMMUNOL is very economical . . .



can be applied by any method



and has many uses

You Can Use IMMUNOL . . .

as a bucket solvent, replacing kerosene, to clean metal parts and equipment; to replace vapor degreasing; to improve alkali cleaners; as a rust preventive; to prevent water marks after plating; to increase tool life in machining operations; to remove gum deposits in oil operated hydraulic and lubricating systems; for quenching, hydrostatic testing, magnetic inspection, and for general plant housekeeping.

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and many other
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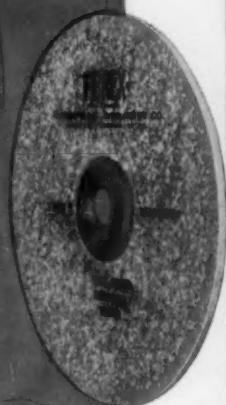


GRINDING WHEELS

MOUNTED WHEELS

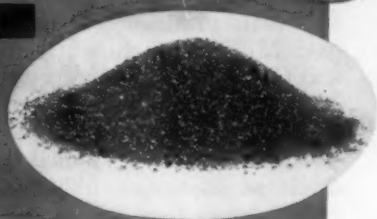


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For the results you want, plus the economy you need, use Simonds wheels for long, continuous service on maintenance and precision grinding — Fibrex wheels for fast, safe action on metal finishing, weld grinding, cutting-off, cleaning up — and Borolon grain for real savings on all your polishing jobs. Order from your Simonds Abrasive Company distributor.

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OVER THE EDITOR'S DESK . . .



CO-OP BIRTHDAY

In a week long series of activities, the University of Cincinnati last month celebrated the 50th Anniversary of the founding of the Co-operative method of engineering education. Highlighting the event was the homage accorded the late Dean Herman Schneider for his part in originating co-operative education at the Cincinnati school.

The celebration was sponsored by a blue-ribbon group of American industrialists headed by Frederick V. Geier, president of the Cincinnati Milling Machine Company, and Cyrus R. Osborn, vice-president of General Motors Corporation. With ceremony befitting the occasion, these men were joined by hundreds of educators, industrial and civic leaders from across the country in reviewing the value derived from co-operative education.

In a message to the university president Walter C. Langsam, President Eisenhower expressed the hope that the anniversary program would emphasize the continuing contributions which co-operative education can make to the development of individual students and to our national defense and industrial progress.

A greater amount of emphasis must be placed upon the co-operative method of education wherein the student spends part of his time in the school classroom and part time employed on a job in industry if this country ever intends to meet the challenge of ever-increasing industrial needs.

★ ★ ★

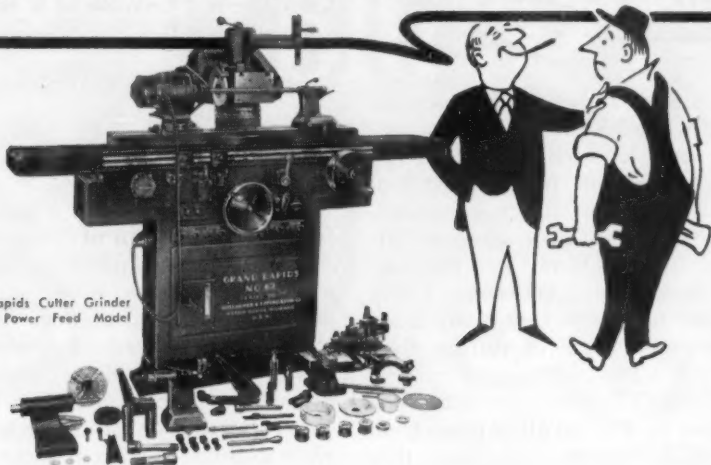
WHAT'S IN A NAME?

What's in a name? is a question asked by Mr. Shakespeare and he concluded, you will recall, that it did not make a great deal of difference. Still, he may have been wrong. Consider, for example, the fuss that's being raised about the name "automation". It's too new a word for the average dictionary, but already it's become a troublesome word.

It has been called the replacement of men by machines. In some people's minds, it calls up a picture of lonely factories spewing out goods produced by silent robots. Actually, automation is just another way of saying that mechanization can go still further in taking the drudgery out of work while adding to our output per man-hour.

I'LL DO THE SET-UP ON THE GRAND RAPIDS GRINDER

Grand Rapids Cutter Grinder
No. 62 Power Feed Model



The boss knows a soft touch when he sees one. He's been around the toolroom long enough to know that Grand Rapids Cutter Grinders are famous for unusually fast and convenient set-ups. Like toolroom experts everywhere, he knows, too, that Grand Rapids Cutter Grinders are unmatched for precision sharpening, fast, easy operation and minimum maintenance.

Model 62 has four-speed spindle drive, fully guarded ball bearing ways, more vertical capacity and exceptionally long swing. One-shot lubrication system cuts maintenance time.

Take a tip from the boss . . . choose Grand Rapids Cutter Grinders for fast, easy, *precision* toolroom grinding.



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Please send me literature on the complete line of Grand Rapids Cutter Grinders:

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City State



Man first latched on to mechanization when he invented the wheel. He went a lot further when Henry Ford figured out how to put four wheels under an internal combustion engine to mass-produce his Model T. Eli Whitney had the same idea, and so did the same fellow who got people to buy ready-made cigarettes instead of rolling their own.

It doesn't require too much imagination to see that all of these ideas created far more jobs than they eliminated. Following the same path, automation, which has been called the process by which machines regulate other machines, will, and has already, led to new products and increased production of established products. In a word, jobs, not joblessness.

★ ★ ★

THE BLUEST CHIPS

In the year 1954 there were twenty-nine corporations in the United States with sales of one billion dollars or more. Last year the number advanced to thirty-three. There were five newcomers. One of 1954's group of twenty-nine dropped below the one billion dollar level. In 1939 there were only two firms in the billion-a-year category—General Motors and the Bell System.

Those firms who advanced to the blue ribbon ranking in 1955 were Firestone, International Harvester,

RCA, Republic Steel and Union Carbide. Boeing Airplane dropped from the list because of a reduced volume since the Korean war peak.

★ ★ ★

FOR THOSE WHO WOULD MANAGE

Recently as we read a quotation from the great genii of China K'ung Foo-Tsze, better known to us today as Confucius, we were reminded once again that time does little to change the pattern of human behavior and that basic principles applicable to human behavior are as timely to today's problems as they were to those in ancient times. Confucius was born in 551 B.C., eighty-two years before Socrates. After serving as Minister of Justice in his native land, he wandered from state to state, offering advice to those princes who would listen to him.

In attempting to manage the affairs in our shops today, we would do well to heed some of the words of wisdom uttered by this man Confucius nearly twenty-five hundred years ago. Here's what he had to say: "The *ancients* who wished to illustrate illustrious virtue throughout the kingdom first ordered well their own States. Wishing to order well their States, they first regulated their families. Wishing to regulate their families, they first cultivated their persons. Wishing to cultivate their persons, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they first extended to the utmost their knowl-

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To boost your production—have fewer resharpenings—reduce drill breakage—lower costs—Whitman & Barnes manufactures a complete line of drills for ferrous metals. Each drill type is specifically designed to provide highest efficiency when drilling individual metals.

Over 100 years of research, experience and engineering have enabled W&B to provide better drill designs—"There's A Big Difference"—that difference means faster, better and more economical drilling for you. Call your W&B distributor for quality service and the best in drills.

Whitman & Barnes manufactures complete lines of standard drills, reamers, carbide tools, counterbores, countersinks and tool bits, also special tools to your specifications.



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LOS ANGELES

For more data circle 291 on Reader Service Card

June, 1956

modern machine shop 95



edge. Such extension of knowledge lay in the *investigation of things*.

"Things being investigated, knowledge became complete. Their knowledge being complete, their thoughts were sincere. Their thoughts being sincere, their hearts were then rectified. Their hearts being rectified, their persons were cultivated. Their persons being cultivated, their families were regulated. Their families being regulated, their States were rightly governed. Their States being rightly governed, the whole kingdom was made tranquil and happy."

★ ★ ★

THE MARKET PLACE

In days gone by one of the areas of great activity in the town or community could be found in the bustling market place. Here it was that customer and merchant came together to barter, to trade, to exchange both products and information. This method of conducting commercial activity involved the time-consuming and sometimes costly element of travel — specifically travel to a market place. While this was not always the most convenient type of setup, it was nevertheless, the best available means for purchasing what you wanted or needed, or for learning about new developments and new products.

Consider now, if you will, the similarity between the market place of yesteryear and a publication such as *Modern Machine Shop*. Within this magazine may be found illustrations and descriptions of hundreds upon hundreds of the latest developments in the metalworking field. All of the information on these new developments is yours to take. The only price you pay is the time that is required to read about them.

One of the most expensive wastes in business today is caused so often by unnecessary duplication of effort. Every time a man in a laboratory does, as an original experiment, something that's been done by someone before him and written down, he has wasted time. Every time a businessman tries out a plan that has been tried out and failed before, he is wasting time and money. That is one good reason why reading is so essential to every metalworking plant executive. The consistent reader of *Modern Machine Shop* can become the best informed man in the metalworking field.

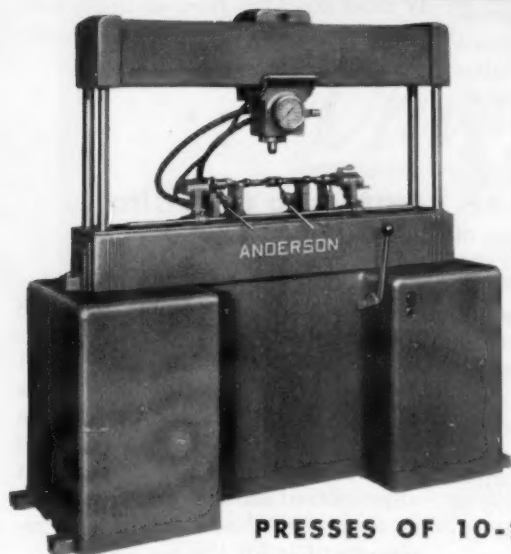
★ ★ ★

LABOR COST AND THE PRICE OF MACHINERY

The cost of machinery and equipment to American industry relative to the average cost of an hour's labor has been reduced since 1941 by almost one-third. The rise in average employment cost per hour actually worked since 1951, in the case of capital equipment producers, has been more than double the advance in machinery prices.

Speed-up

**YOUR CHECKING AND
STRAIGHTENING JOBS!**



Anderson

**HYDRAULIC
POWER
PRESS**

PRESSES OF 10-25-50 TON CAPACITY

Built with stationary or traveling ram . . . so sensitive a shaft may be straightened to within .001". Straightens and checks in the same position. Flexible, accurate control valve operated by a hand lever. Manufacturers with straightening, checking, and truing operations that require speed and accuracy find Anderson Power Presses to be the answer to their problems.

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Write for Bulletin No. 6-22.

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The analysis and underlying statistics supporting these conclusions are presented in a two part study by the Machinery and Allied Products Institute on the comparative movements of machinery and equipment prices and average hourly labor costs. U. S. manufacturers generally will be interested in the first part of this study, which measures the long-term relationship between the general wage level in the manufacturing industries and the prices of machinery and equipment. The second part of the study, which pertains to capital equipment producers specifically compares their average hourly labor costs with capital equipment prices since 1951.

The Institute study indicates that during the period 1922-41 the ratio of machinery and equipment prices to the wage rates paid by users of capital equipment declined at an average rate of 1.08 per cent annually. For several years after 1941 the ratio declined at a much more rapid rate and since 1951 the downward trend has been at better-than-normal average rate of approximately 1.80 per cent per annum, compounded, the current underage being 19 per cent.

In the second part of the study a breakdown for six categories of machinery and equipment shows that since 1951 all six classes of equipment made marked gains in the relation of product prices to average labor costs per hour actually work-

ed to the producers of equipment. For the machinery industry as a group the rise in producers' average hourly labor costs has been 25.1 per cent compared to an 11.3 per cent rise in machinery prices.

The Institute's analysis suggests that this reduction in the ratio of machinery prices and average hourly labor costs has been an important stimulus to postwar capital equipment sales.

★ ★ ★

Letters to the Editor:

REPLACEMENT

I certainly appreciate the fine way in which you treated the subject of replacement in your April issue. Possibly, some of the readers of your fine publication will take heed and do more planning in this area themselves. Unfortunately, it appears that too many of the smaller shops feel that machine tool replacement is for the big fellow.

I think that one of the real contributions the trade press can make to all of the metalworking industry is a continuing emphasis on replacing obsolete and un-economic facilities. Of course, we have a personal interest in expanding the replacement market. But, we also recognize that economic mobilization potentials require all of industry to be better equipped than it is today.

*James C. Kelley, General Manager
American Machine Tool
Distributors' Association*

WHEN SHARPENING DRILLS

PRECISION

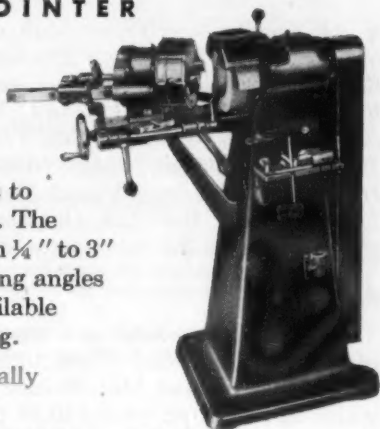
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DRILL POINTER

With the Oliver 510 Drill Pointer, all of the movements in sharpening a drill are automatic, and accomplished by fixed mechanisms to eliminate all chance of error. The Oliver 510 holds all drills from $\frac{1}{4}$ " to 3" diameter and provides varying angles from 82 to 160 degrees. Available for either wet or dry grinding.

Oliver achieves the theoretically perfect point.



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TOOL & CUTTER GRINDERS • DRILL POINT THINNERS • TEMPLATE TOOL GRINDERS

For more data circle 293 on Reader Service Card

June, 1956

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OVER THE EDITOR'S DESK . . .



LAYOUT

We will appreciate any literature which may be available concerning the design, lighting, ventilation and layout for a small plant maintenance type machine shop. Tentative plans are for a shop area of 3200 sq. ft. served by an overhead crane.

R. E. Willis, Plant Engineer
Ash Grove Lime & Portland Cement Co.
Chanute, Kansas

● An excellent reference book on the subject is "Running a Machine Shop" by Colvin and Stanley, published by McGraw Hill Book Company, 330 West 42nd St., New York 18, New York. Also, contact Homer H. Dasey, President, Visual Plant Layouts, Inc., Box 233, Oakmont, Pennsylvania.—Ed.

REQUESTS

Will you please send us a reprint of the article entitled "How to Select Steels for Best Machinability" which appeared on page 118 of the April issue?

N. Newstein, Production Manager
Machine Products Mfg. Co.
Wyncote, Pa.

Would it be possible to obtain 25 copies of the article entitled "How Good a Boss Are You?" by Alfred M. Cooper. This article is in line with a foreman's program now being conducted in our plant.

R. E. Stevens, General Superintendent
Lawson Machine and Tool Company
Malden 48, Mass.

Please send me two copies of reprint "Clamping on the Tangent" which appeared on Pages 106 thru 117 of the January issue of Modern Machine Shop.

Walter A. Bates, Jr.
Walter Bates Company
500 Mills Road
Joliet, Illinois

Am very much interested in the articles "Fabricating Welded Steel Tubing." We would appreciate receiving copies of the complete series of articles.

Max P. Mohorick, Tool Designer
Brainard Steel Division
Griswold Street
Warren, Ohio

Would appreciate it if you can send me information explaining the technique of metal spinning. I believe, in your magazine Modern Machine Shop issued January, 1948 there was an article published on the subject of metal spinning by E. R. Yarham.

F. P. Bilski, Superintendent
Nulco Mfg. Co.
335 Barton St.
Pawtucket, R. I.

More Information?

**For additional information
on any product mentioned
in this issue, please use the
READER SERVICE CARDS
opposite pages 32 and 340.**



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(opposite Hand TL)

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Armide and other carbide
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June, 1956

modern machine shop 101

FEATURES IN

MASS PRODUCING DIESEL ENGINE TURBOCHARGERS

By Gilbert C. Close

In the shops at the AiResearch Industrial Division of the Garret Corporation, Los Angeles, California, ultra-precision machines are used in mass producing diesel engine turbochargers to close tolerances. A large number of illustrations, showing the machine tools and other equipment used in manufacturing turbocharger parts, are included. Page 104.

SWINGING BOLTS AND CLAMPS

By Fred Rogers

This first installment of a two-part article deals with various types of swinging bolts and their nuts, washers, knobs and handles. Positioning stop and pivoting arrangements are also discussed. Page 112.

METHOD FOR TESTING CUTTING FLUID EFFECTIVENESS

By Jacob H. Sperman

The author, who is president of Sperman Metal Specialties, Brooklyn, New York, explains how an ammeter is used to determine the lubricant best suited for the machining requirements of his shop. Page 122.

STANDARD COSTS IN ACCOUNTING FOR PROFITS

By Jack E. Bedford

How cost accounting is designed to show machine shop management the actual cost of a production order after it has been completed is discussed in this article. Page 126.

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RANDOM PHOTOS OF ASTE BOOTHS

Photographs, taken by the staff of *Modern Machine Shop* at the American Society of Tool Engineers Industrial Exposition held recently in the International Amphitheatre in Chicago, are presented in this pictorial section. Page 132.

VISUALIZING PLANT LAYOUT IN THREE DIMENSIONS

By H. H. Dasey

In this informative two-part article the author, who is president of "Visual" Plant Layouts, Inc., Oakmont, Pennsylvania, presents some time and money-saving suggestions for those persons interested in efficient layout planning. Illustrations, showing methods for making scale model plant setups, are included with the text. The second installment of this article will be published in the next issue of this magazine. Page 140.

MACHINING STAINLESS STEEL

By G. J. Stevens

This case history illustrates and explains how one particular shop fully overcame difficulties experienced in the turning of hot-rolled stainless steel bar stock. Page 154.

STAKE NOTCHING PROJECTILES

The discussion covers a unique milling machine setup for the semi-automatic stake notching of 105 mm. and other projectiles on a production basis. Page 156.

VOL. 29

NO. 1



Mass Producing Diesel

Ultra-precision machines hold tolerances on parts in low "tenths."

By GILBERT C. CLOSE



Perhaps the biggest advance in precision production in the past decade has been its adaptation to mass production line techniques. Precision machine has come down off its pedestal, so to speak, and joined the mob. Today, shoulder-to-shoulder with the punch press, drill press, and conventional mill, it is turning out its daily stint minus any prima donna status and often with a minimum of attention and ultra-skilled supervision.

This is noticeably true in the shops at the AiResearch Industrial Division of the Garrett Corporation, Los Angeles, California. Most of the machines in the line at this plant are of the ultra-precision variety. They have to be. The main product is turbochargers for diesel engines, a dynamic power-boosting accessory that operates at rotative speeds in excess of 40,000 r.p.m. Tolerances on most turbocharger parts are in the low "tenths"; dynamic balance on the rotative parts must be within the weight of metal that can be removed with a whetstone stroke; contours are extremely critical, especially those that serve to channel the hot diesel engine exhaust gases through the turbocharger.

Two production model turbochargers are being turned out at this particular time—the T15 which operates at speeds up to 48,000 r.p.m. and the larger T30 which operates at speeds up to 40,000 r.p.m. These units are being used on the diesel engines used to power Caterpillar crawler tractors. The turbochargers derive their motive power from the exhaust gases of the engines, and in turn use this power to compress the air being fed into the engine. Diesel engine power is often boosted more than 50 per cent by turbocharger installation.

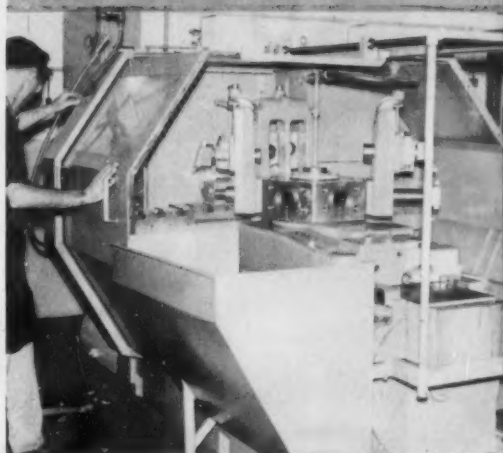
The basic components of the turbocharger consists of Meehanite and aluminum castings and forging produced by sub-contractors, to AiResearch specifications. The turbine housing and the center castings are of Meehanite which provides good high temperature strength yet avoids the "critical material" category. The turbine wheels are of forged high temperature alloy. The center housing contains the rotating group along with seal provisions that prevent oil from entering the turbine or compressor. Steel-backed shell bearings are used in the units.

Every type of casting that enters

Engine Turbochargers

the AiResearch shops must receive more or less critical machining. The shop machines are arranged in groups so that the work may progress from one machine to the next. When the castings enter the shop, they are placed on pallets which may be moved along from machine to machine as the work progresses. To conserve shop floor space, these pallets are so designed that they can be stacked three-high when and if a pile-up of in-progress work occurs anywhere along the line. In some cases, roller conveyors between the machines serve to transport the work from one position to the next before the part is re-palletted.

As high precision is needed all along the line, the precision machines (though extremely versatile in concept) are usually tooled and used for a limited number of operations. This reduces set-up time and permits each operator to become more skilled in his particular operations. The line that machines and drills the housing components is a good example of this layout. On this line, three Bullard Cut Masters (a 30-inch, and two 26-inch) and two Potter and Johnson automatic chuckers provide the initial machining and contouring in progressive stages. The housings then pass to a line of five multiple-spindle drills (3 Cincinnati and 2 Natco) each tooled for multi-drilling the various housing components. Auxiliary



This Potter and Johnson setup is used for the purpose of machining turbocharger shrouds to a tolerance within 0.0002 inch.



Milling a diesel engine turbocharger housing on a huge, 30-inch Bullard Cut Master. Tolerance is held to within 0.001 inch.

Mass Producing Diesel Engine Turbochargers . . .

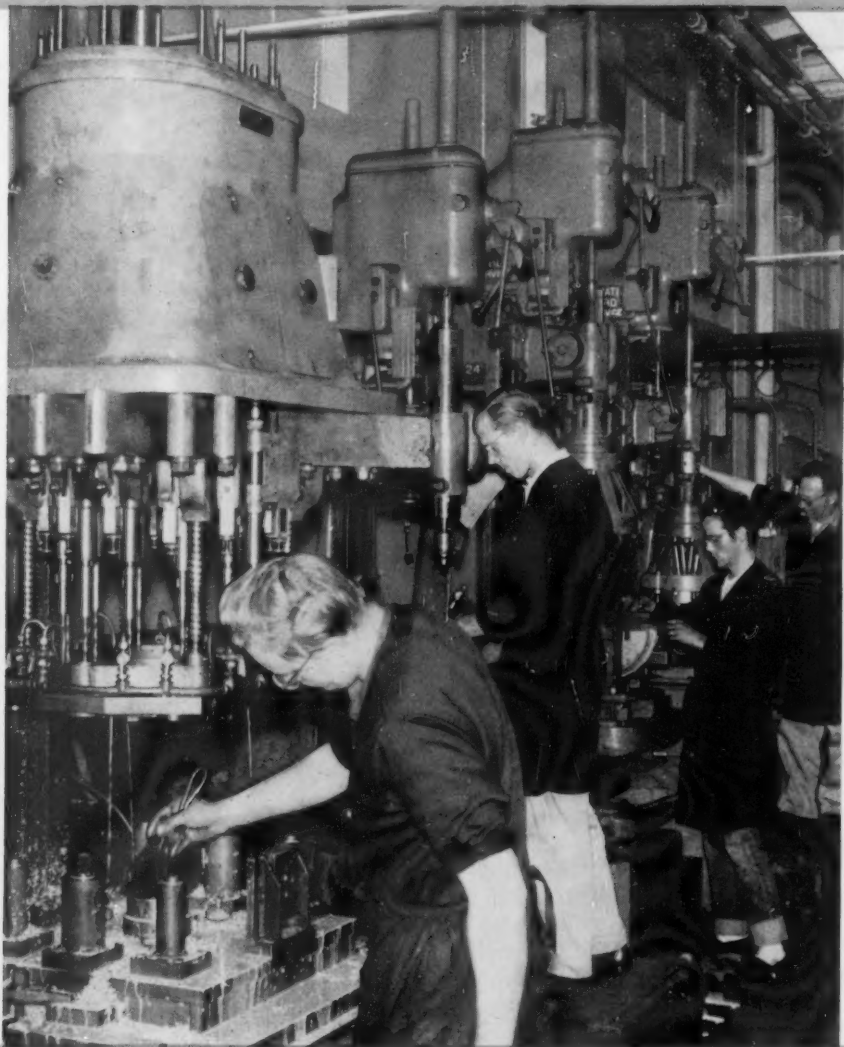


Illustration showing line-up of multiple-spindle drills employed at AiResearch for the drilling of turbocharger housing components. Most work passes progressively from drill to drill.

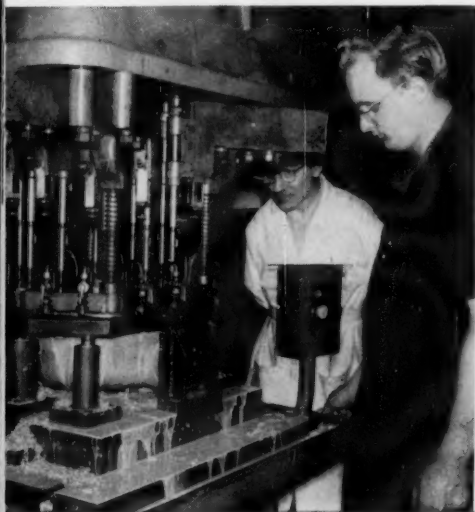
"Tolerances are in the neighborhood of 0.001 to 0.0002 inch."

"one-shot" machines are used along this line to perform specific single operations, such as Avey automatic boring machine for the compressor housing unit, and a Cincinnati surface broach for the bearing carriers. Tolerances all along this line are usually in the neighborhood of 0.001 to 0.0002 inch.

The line that produces the turbocharger rotating group is somewhat more diversified due to the extreme tolerances and balances required. Contouring is a major operation on this line. The bladed and vaned parts are contoured on two

turret lathes and three Monarch engine lathes, one provided with a tracer. Grinding tables (such as the Besly Beloit grinding table shown in the illustration directly below) are used for critical lateral dimensioning purposes.

The shaft that mounts the rotating parts is first "rough machined" in an Acme Gridley Bar Matic. This operation "roughs" the shaft itself and the oil seal surfaces to within 0.005 inch. After heat treatment the shafts are then set up for grinding and smoothing to within 0.0002 inch. A Brown & Sharpe, a Cincinnati,



Turbocharger housing component set up for drilling in a huge Natco multiple drill.



Face grinding a turbocharger component mounted on Besly Beloit grinding machine.

"... machine detects any unbalance sufficient to cause a center of gravity displacement of 25 millionths inch."

and a Norton contour grinder are used in this machine group. After grinding, the shafts go to a Lambert Superfinisher for the final machine shop operation. Here the shaft journals are sized to within 0.0002 inch, while lateral vibrating hones produce a journal surface smooth to within 4 micro-inches.

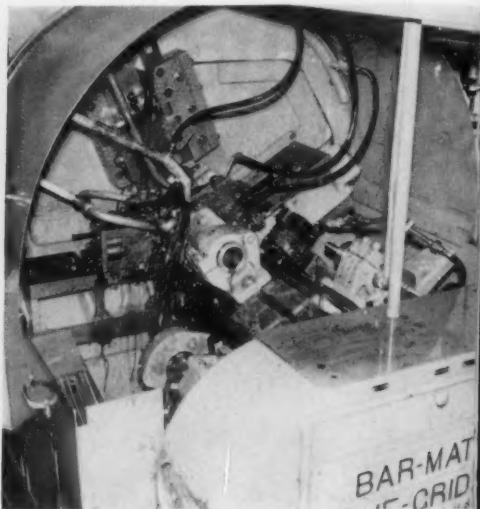
The high-speed rotating components then enter the balancing room where they are balanced individually and as an assembled group. Production balancing is accomplished at 1500 r.p.m. A Gisholt Dynetric balancing machine is used which will detect any unbalance sufficient to cause a center of gravity displace-

ment of 25 millionths of an inch. This machine not only detects any unbalance, but is synchronized with a stroboscopic light so that the location of the metal causing the unbalance can be located. The parts are first balanced individually, being spun and stopped for metal removal until the specific balance is obtained. The assembled rotating group is then balanced again.

As an example of the accuracy of balance required in these ultra-speed rotating parts, the shaft is balanced to within 0.02 gram-inches, the compressor wheel to within 0.07 gram-inches, and the hot wheel to within 1.8 gram-inches.



Boring shaft holes in a turbocharger housing on an Ex-Cell-O precision boring machine.



"Roughing" a turbocharger shaft to within 0.005 inch on an Acme-Gridley Bar-Matic.

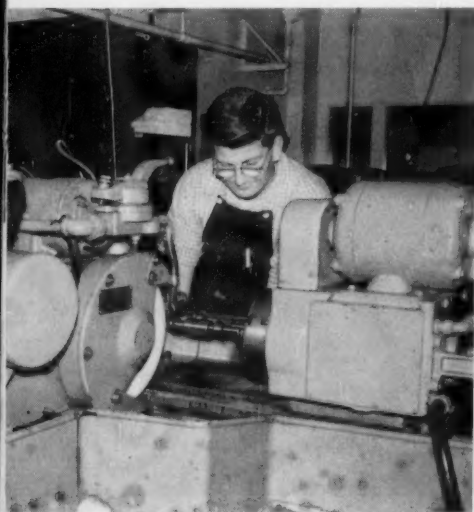
The exducer is statistically balanced to within 1 gram-inch.

As most parts in the turbocharger must operate continuously at elevated temperatures, the external protective finishes must be heat resistant. All parts leaving the machine shop production line are conveyed directly to an automatic washing machine for cleaning in a mild alkaline solution. Cleaning is by spray action as the parts are conveyed through the washer. Beyond the washer, parts not to be surface coated are removed from the washer conveyor and transferred to an overhead parts conveyor which enters the assembly department. Parts to be surface coated continue on the washer conveyor into the paint room.

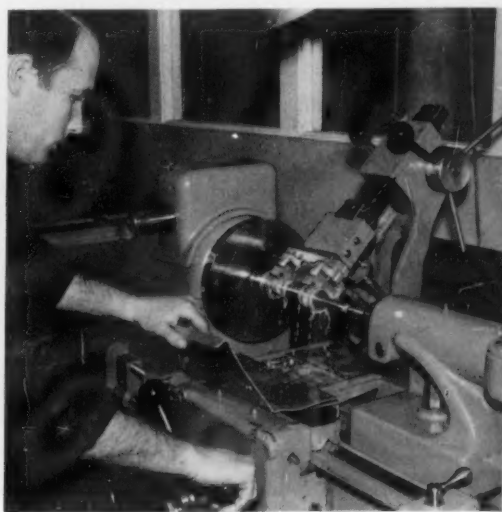
At the 10-foot, water-wash paint

booth, the parts are removed from the conveyor by the operator, spray-painted with a coating of aluminized paint with a silicon base, and then placed on the drying oven pallet. When the pallet is filled, it is wheeled directly into the electric drying oven where the coating is baked for 20 minutes at 400 degrees F. When the pallet is removed from the oven, the parts are allowed to cool and then are transferred to the conveyor leading into the assembly area.

All turbocharger parts entering the assembly department converge in a single area. Some come by overhead conveyor. Others arrive on the machine shop pallets transported by a lift truck. Here the parts are selected and scheduled according to the requirements of the



Grinding a turbocharger shaft to within 0.0002 inch on a Cincinnati grinding machine.



Honing the journal surfaces on a turbocharger shaft using a Lambert Superfinisher.

"... partially assembled turbochargers are allowed to 'free wheel' on the oval-shaped conveyor system ..."

two assembly lines—one for the T15 unit and the other for the T30 unit. The parts scheduled for assembly are placed on pallets which in turn move along a roller conveyor line. An overhead tracking arrangement steers the pallet off on a branch conveyor leading to the intended assembly line. This simple arrangement is entirely automatic and controlled by the overhead tracking arrangement at the beginning of both the T15 assembly line and T30 assembly line.

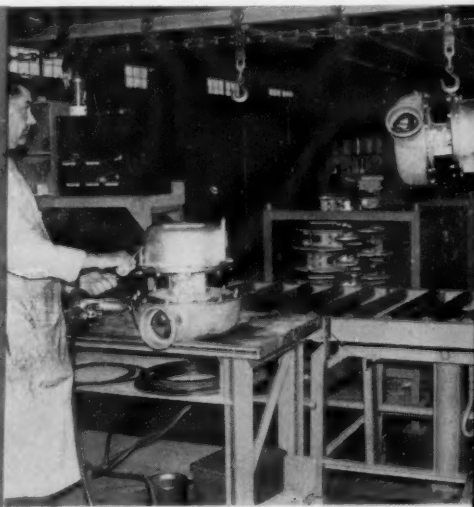
The roller conveyor continues onward along each assembly line and contains the parts to be assembled.

An overhead conveyor then picks up the assembled turbocharger (or in some cases partially assembled turbochargers to convey them to a new assembly location) and transports it to the shipping location. The partially assembled turbochargers on the overhead conveyor are allowed to "free wheel" on the oval-shaped conveyor system until they are needed at the next assembly location. The partially assembled units are not removed from the overhead conveyor when they pass through the packaging and shipping area of the plant.

The roller type conveyor in the



Balancing a turbocharger rotating assembly on a Gisholt Dynetric balancing machine. Extremely fine balance is required on parts.



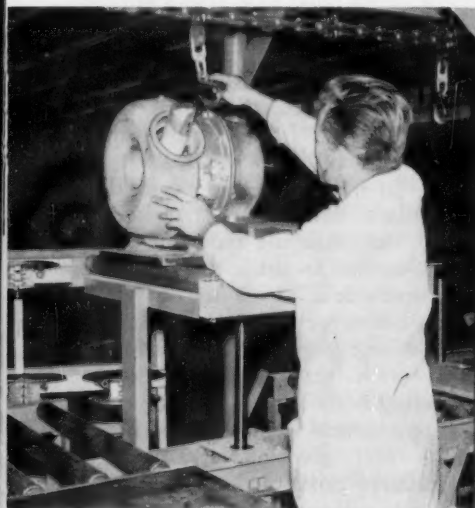
A turbocharger nears completion on the assembly line. Another unit journeys toward shipping department on overhead conveyor.

assembly line is provided at intervals with sections which can be hydraulically lifted by actuating a lever. This eliminates any manual lifting effort in transferring either the partially finished turbochargers or fully assembled turbochargers from the roller type conveyor to the overhead conveyor.

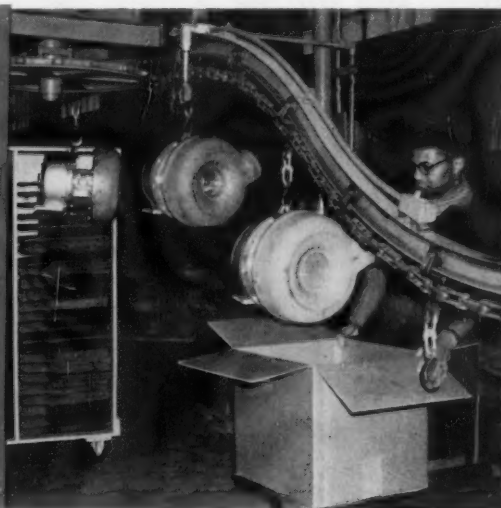
As the fully assembled and conveyorized turbochargers near the shipping department, they receive a final inspection while still on the conveyor line. When the conveyor enters the shipping area, it dips downward so that the conveyed turbocharger is deposited directly into its shipping container or box. The operator at this particular station has only to unhook the turbocharger from the conveyor after it is lowered into the shipping carton.

In actual shipments to the customer, eight boxed turbochargers are often steel strapped to a wood pallet. This arrangement makes for a convenient and easily handled shipping unit, and provides the utmost in in-transit safety.

This, then, is precision production at its best—the utmost in accuracy blended with and conforming to mass production techniques. G. S. Williamson, company vice-president and manager of the AiResearch Industrial Division, says that the production potential of the 63,900 square feet plant is approximately 400 turbochargers a day with some 300 employees divided between two eight-hour shifts. The plant itself was fully engineered and laid out by means of the J. B. Seage Company, of Los Angeles, California.



"Lifting" a section of the roller conveyor assembly line so that the assembled unit may be readily hooked to the overhead conveyor.

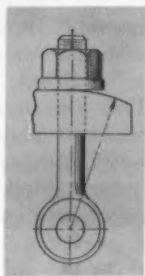


When the conveyor enters the shipping department, it dips and lowers the turbocharger directly into its particular shipping carton.



Swinging Bolts and Clamps

By FRED ROGERS



This first installment of a two-part article deals with swinging bolts, their nuts, washers, knobs and handles; also positioning stops and pivoting arrangements.

The reason for the use of swinging bolts and clamps can be summed up in two words—greater efficiency. Applying this to general machine and production work, it means the rapid manipulation of work clamping members. Specifically, as applied to jigs and fixtures,

this would mean the slightest loosening possible of the retaining nut, whereby the least number of turns is sufficient to tighten or loosen the nut. Further, it means reducing loading and unloading time.

Swinging bolts as well as swinging clamps find many uses for holding work to be drilled, reamed, counter-bored and tapped. Milling, boring and planing fixtures utilize them. Covers, caps, hoods and hinged doors can be held with swinging bolts. In fact, they can be used in any place where it is required to swing the clamping mechanism out of the way so as not to interfere with the operator's access to the work-piece before or after machining.

The first part of this article will deal with the various types of swinging bolts and their nuts, washers, knobs and handles. Positioning stops and pivoting arrangements will also be portrayed and discussed. The second part will show and explain the use of swinging clamps.

Probably the most widely used swinging bolts are the so-called rod

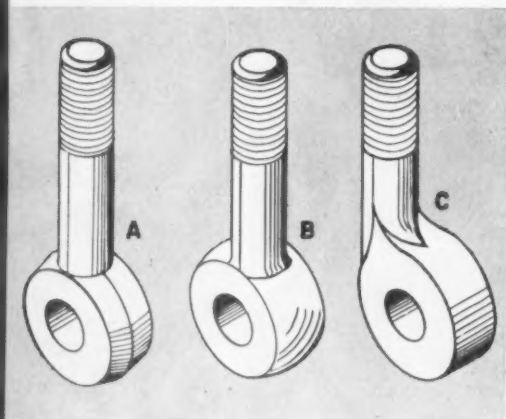


Fig. 1—(A) Drawing of a rod end swinging bolt, available from numerous sources; (B) drawing of another type of rod end swinging bolt that is widely used; and (C) special rod end swinging bolt with off-set head.

end bolts, as shown in Fig. 1. Designs A and B are the most common and can be purchased from numerous sources. The design shown at C is of a special nature, the head being offset whereby one side of the body and head are flush. The rod end bolt shown at A in Fig. 1 is a drop forging, the head tapering each side from the center outward, which is, of course, the draft of the forging die. Different sizes are available from 3/16 inch to greater than 1 inch on the body diameter and in various lengths up to 6 inches long. Head diameters vary from 3/8 to 2 1/4 inches, while head thicknesses range from 1/4 to 1 1/2 inches, all the dimensions being the "as forged" measurements. Usually, there is enough stock either side so that head thickness can be machined equal to the diameter. Being made of mild steel, the bolt is said to weld easily so that it can be made longer by butt welding. The length of thread and the hole diameter are at the designer's requirements, these factors being determined in his shop.

Dimensions in Table 1 were selected by the writer from 36 different sizes and lengths made by one manufacturer as being a representative list of bolts. The sizes chosen compare more closely to sizes in the other tables which will be explained later on in this article. These dimensions are unfinished. It will be noted that in three bolts the diameters and head thicknesses are the same. A surface grinder was used to just clean off the head surfaces, slabbing off the thread diameter at the same time. The thread then had two small but unobjectionable flats along the length of the threaded

body. It will also be noticed that the length under the head is not progressive, but in some instances the body can be cut to suit conditions.

The rod end bolt shown at B in Fig. 1 lends itself admirably to the use implied in this article. This design of bolt is also drop forged and is made of carbon steel. It is regularly furnished "as blanked" or with faces milled and head drilled. The blanks are 1/16 inch thicker at the head to allow for finish of 1/32 inch each side. These and other dimensions are shown in Table 2. It will be noticed that the finished thickness of the head is 1/16 inch greater than the diameter of the screw in body sizes of 1/4 through 9/16 inch and 1/8 inch greater for sizes 5/8 through 1 inch diameter body. This allows sufficient clearance for the swinging, so that the screw body will not bind in the slot in which the head hinges. The size of the head is ap-

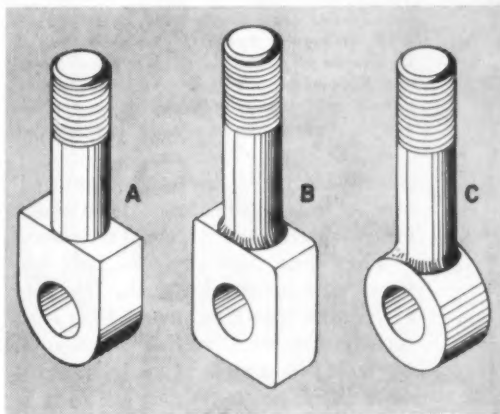


Fig. 2—(A) Single-piece swinging bolt, standard with several jig and fixture part makers; (B) bolt similar to bolt (A) but made in two pieces, welded together; and (C) bolt made of two cylindrical pieces welded together.

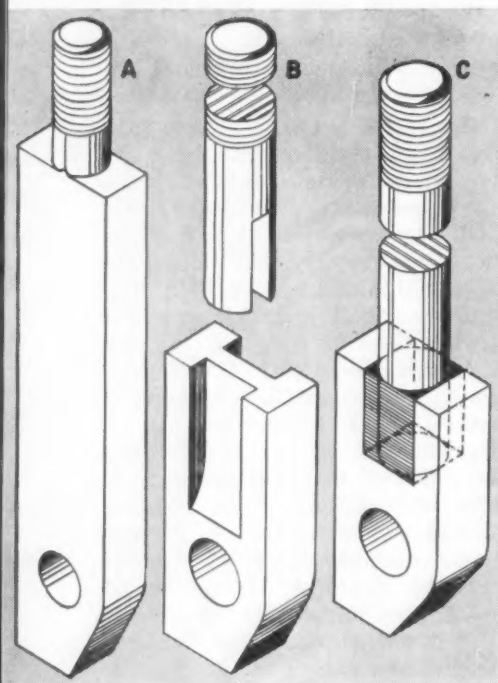


Fig. 3—(A) Long single-piece swinging bolt with rectangular head; (B) swinging bolt in which rod is slotted to engage lower piece; and (C) swinging bolt in which the head is slotted and the cylindrical shaped screw end is slipped into the head and welded.

proximately $2\frac{1}{4}$ times the body diameter to accommodate a hole which is equivalent to the thread diameter.

This type and style of bolt has been standardized by the Society of Automotive Engineers. It is used mostly for automobile and tractor work. It is somewhat lighter than the ones in Table 2 as can be seen in Table 3. Head diameter is about two times the thread diameter. Dimension B for the three largest diameters was not available so does not appear in the table. The head thick-

ness is a trifle less than those in Table 2. The short lengths are most noticeable because ordinarily they are used with plain and adjustable yoke ends. When adapted to the work explained in this article, pieces will have to be butt welded to the body to lengthen. This can be done readily because of the mild steel in the forging.

Perusal of the advertising pages of this magazine as well as other mechanical periodicals will disclose a host of manufacturers which make jig and fixture parts in a number of sizes. These makers have standardized bolts, washers, keys, clamping and holding devices, levers, handles, cams, nuts, studs, work rests, and a number of other parts. Among these are rod ends or eye bolts as they are commonly called. In one set of three bolts of the type shown at B in Fig. 2, a $\frac{1}{4}$ -inch bolt has a $\frac{1}{2}$ -inch diameter head, $\frac{1}{4}$ inch thick with $\frac{3}{16}$ -inch hole, and a length from center of head to end of $2\frac{1}{8}$ inches. A $\frac{1}{2}$ -inch bolt has a head 1 inch in diameter x $\frac{1}{2}$ inch thick, a $\frac{3}{8}$ -inch hole, and is $3\frac{3}{4}$ inches long. The $\frac{5}{8}$ -inch size is $1\frac{1}{4}$ inches in diameter at the head x $\frac{5}{8}$ inch thick, with a hole $\frac{5}{8}$ inch in diameter and a length of $4\frac{1}{2}$ inches. These standardized eye bolts are made of alloy steel and are heat treated to withstand rough usage and provide long life. In all three bolts, the head thickness and the diameter of the thread are the same dimension. When in use, the slot in which the head hinges is made with a slight clearance to avoid binding.

As mentioned above, the bolt shown at C in Fig. 1 is a special and is used with pieces where the hinge

ears protrude and where it is desired to keep the swinging piece as short as possible. This usually is a home-made job fabricated from two cylindrical pieces and welded together and dressed off smooth.

The design shown at A in Fig. 2 is a popular one as it is standard equipment with the several manufacturers of standardized jig and fixture parts. The bolt is attractively finished and cyanided overall, and the hole is chamfered slightly each side. The end of the head is rounded off concentrically with the hole so that it will swing in restricted slots. The one shown, however, is a shop made bolt, not purchased. It is a single piece, the stock having been turned down to a threaded body.

Swinging bolts of the type shown at A in Fig. 2 are sometimes made in two pieces and welded together as illustrated in the design at B in Fig. 2. In this instance, it was felt that the welding operation offset the turning operation with its consequent waste of stock. Also, when it is not necessary to mill the top of the head to a half-round shape, it can be left square as shown. In the design at C in Fig. 2, a bolt is made of two cylindrical pieces welded as shown.

When a long single-piece swinging bolt with a rectangular head is required, it can be made like the one shown at A in Fig. 3. Made of rectangular stock, it is turned down only for a sufficiently long thread. This will be satisfactory if the weight of the piece or pieces is not a factor. If weight must be considered, the bolt could be made like the one at B in Fig. 2 with a long rod at the end.

A somewhat expensive type of

bolt is shown at B in Fig. 3 in which the rod is slotted to engage the lower piece which comprises a double-slotted head. The pieces are either pinned or welded together. The lower ends below the hole in both designs A and B in Fig. 3 are made purposely long so that the tapered surface on the right-hand side can be used for limiting angular movement when assembled into the clamping mechanism. In all the bolts shown thus far, the hinge or pivoting hole is reamed to the customary shop tolerances, rather than leaving it just a drilled hole. Sometimes the bolt swings on the pin with a good running fit and at other times the pin is pressed into the swinging piece or held with a screw or pin, so that in either instance the hole finish

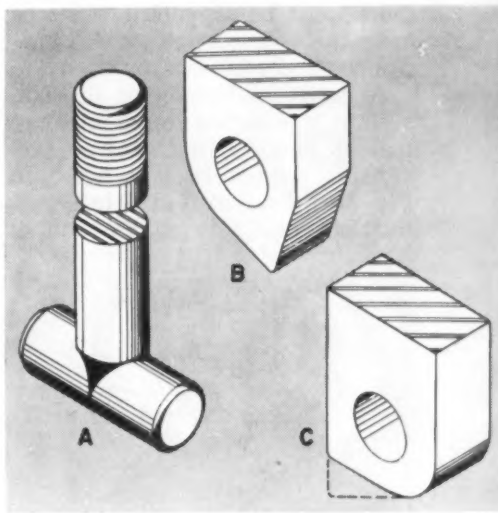


Fig. 4—(A) Two-piece swinging bolt in which lower part acts as pivot pin; (B) lower part of swinging bolt with integral stop; and (C) drawing showing how squared side on swinging bolt can be extended to act as a stop.

"Angular positioning of the bolt after it is loosened is important . . ."

should be smooth for a proper fit.

The design shown at *C* in Fig. 3 is a variation of the design shown at *B*. The head is simply slotted and the cylindrically shaped screw end slipped in and welded at the four corners as shown. Another type of swinging bolt is presented at *A* in Fig. 4 in which the lower part acts as the pivot pin. It is made of two pieces of cold drawn round steel stock. The upper piece is cut off square and welded as shown. In another method, the upper piece is milled at the lower end with a half-round cut so as to fit halfway around the lower swivel portion and then welded. Such a tee-shaped piece must be assembled with one loose ear at the hinge which is positioned and afterward fastened.

Angular positioning of the bolt after it is loosened is important in many instances so that stops are provided on the bolt itself, as shown in Fig. 3. In the design at *B* in Fig. 4, the left-hand side of the bolt is

rounded off concentric to the hole for reasons of swinging clearance. The right-hand side is lengthened and flattened off so that the corner edge acts as the stop. In the design at *C* in Fig. 4, the full lines show that only one side is required to be rounded off and, if the squared side on the left is not sufficient to act as a stop it can be extended as the dotted line shows. Designs *B* and *C* show only the lower parts of bolts.

The several swinging bolts having rectangular heads of one sort or another lend themselves readily for machining an integral stop thereon, as just discussed. All that is required is an extension of the stock below the pivot hole and then this extra stock is milled to suit conditions and the shape of the slot. However, when a purchased rod end or eye bolt is to have a built-in stop, other plans must be devised. Two types of stop pins, buttons, or projections are shown in Fig. 5. In the design at *A*, a piece

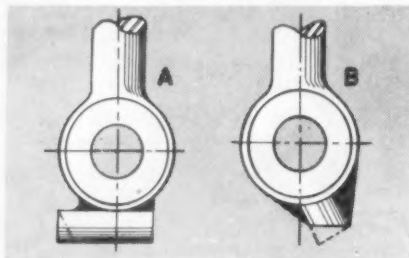


Fig. 5—(A) Drawing showing how stop pin can be adapted to rod end or eye bolt having no built-in stop; (B) another design of stop pin for similar rod end or eye bolt.

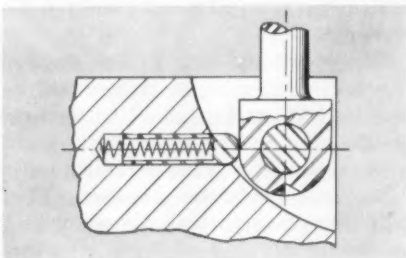


Fig. 6 — Drawing showing a type of positioner which must be provided in the slot of a swinging bolt which has no effective out-of-round shape on the head to serve as a stop.

of cylindrical stock smaller in diameter than the thickness of the bolt head and shorter than the bolt head diameter is welded at the lower end of the head. It is then milled, ground, or filed off to suit when assembly is underway. The dot and dash lines signify the stopping surface. In the design at *B* in Fig. 5, the end of the pin is placed against the head in an approximate position and welded as shown. The other end of the pin is then dressed off to suit.

The reader has doubtless seen in both technical articles and in published books where the author has illustrated the angular positioning of the bolt erroneously. The bolt shown at *B* in Fig. 1 of this article has a flat milled along the periphery of the head at a desired angle. This angular flat is supposed to be the stop as described in the several examples above. It is physically impossible to have such a flat act as a stop when the pivot hole and head periphery are concentric. It takes a projection or protrusion from the head to effect a stop in a given slot. If there is no effective out-of-round shape on the head, then one must be provided in the slot. Such a positioner is shown in Fig. 6. The lower portion of the bolt head is concentric with the pivot pin hole drilled therein. It is desired to swing the bolt 90 degrees and to have an effective stop. A hollow pin slides in a reamed hole and is backed up by a stiff compression spring. The hemispherical end of the pin engages the drill-point spotted hole in the swing-bolt head. In the position shown, the bolt is clamping the work. As the bolt is swung down to the right, the pin head rides along

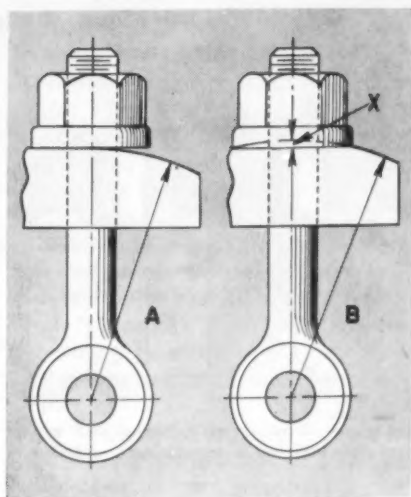


Fig. 7—(A) Swinging bolt clamp assembly requiring only fraction turn of nut for clamping and unclamping; (B) assembly with full bearing washer having radius starting at edge.

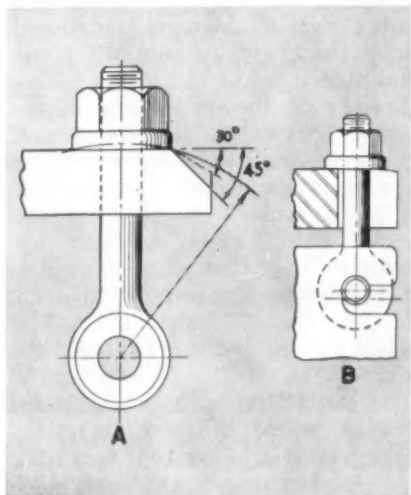


Fig. 8—(A) Drawing of assembly showing that 30 or 45-degree angle does not affect speed with which assembly can be released; (B) assembly with removable swinging bolt.

"... the greater the angle, the quicker the clamp can be released."

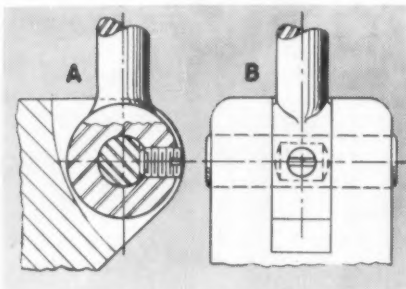


Fig. 9 — Drawing of swinging bolt clamp assembly utilizing a straddle type of bearing.

the head periphery until the drill spot is reached.

Referring to Sketch A in Fig. 7, this design allows for only a fraction of a turn, which is just enough to loosen the tension of the nut and bolt. The swinging arm is radiused from the center of the bolt pivot, the high point of the radius falling directly on the center line of the pivot. This means that the washer under the nut has half a bearing on the upper surface of the arm. This might be found to be objectionable. However, a further objection presents itself in that when the nut is tightened the washer tends to creep. If this creep is toward the left, it tends to hold, but if it is toward the right in the sketch, it would tend to ride down the radius whereby the washer would be insufficiently clamped. If a 75 per cent bearing is satisfactory, then the radius is started to the right of the center line.

If a full bearing of the washer is to be settled on, then the radius will start at the edge of the washer as is

depicted at B in Fig. 7. It is obvious that the length of this radius is greater than that shown at A in Fig. 7. As illustrated, the nut and washer would have to be raised equal to the amount "X" which might mean as much as two complete turns of the nut, depending, of course, on how far it was from the bottom of the washer to the center of the bolt pivot. The greater this dimension, the smaller will be the height of arc "X."

The sketch at A in Fig. 8 was made to show that it makes no difference whether a radius as shown at B in Fig. 7 is used or whether an angular surface is used. The drawing shows that a 30 degree or a 45 degree angle does not alter this fact, although the theory has been advanced that the greater this angle the quicker the clamp can be released. The height of arc as in the design B in Fig. 7 remains the same in design A of Fig. 8.

The assembly shown at B in Fig. 8 is a removable swinging bolt. The pivot hole is drilled at the required location and then both ears are end milled downward and out to the right side enough to release the pin when loosened. A bearing of about 120 degrees results for the pin. The pin is pressed into the swing bolt. No explanation can be given for this design except that the bolt was to be removable in preparation of the fixture for another work operation.

In many instances, it is sufficient for the bolt to swing on the pin. In the design shown in Fig. 9, it was felt that a straddle bearing was more

desirable. The pin is made a running fit in the holes of the ears. So as not to deviate from customary standards, the hole in the bolt is reamed with the same reamer. The pin is therefore loose in the bolt pivot hole. The pin is milled at the longitudinal center to accommodate a cup point set screw of either the slotted or hollow head type. The same type of straddle bearing can be accomplished with a taper pin of the commercial kind. The pieces are drilled and taper reamed together. The bolt is then removed and the two ears are rereamed about 0.0015 to 0.002 inch larger. The pieces are then assembled and the taper pin hammered in so that it is snug in the bolt head.

The clamping media for swinging bolts are varied. They include hex nuts, washers, collar nuts, winged nuts, knobs, and handled clamps. If two pieces are not objectionable, the hex nut and washer shown at *A* in Fig. 10 can be used. Some de-

signers and shop men do not like a loose washer as it means extra manipulation to keep it in the right place. They prefer the collared nut as shown at *B* in Fig. 10. The nut and washer are integral. There is no washer to fall down the threaded body when the bolt swings.

Self-centering, dished, or spherical two-piece washers of the type shown at *C* in Fig. 10 are sometimes used to center the bolt, thereby equalizing pressure.

The hex nut with integral collar shown at *D* in Fig. 10 is ground with a spherical surface. It can be used with the lower half of a spherical washer or in a spherical socket machined in the swinging arm. Sometimes the washer is dispensed with and the bottom of a hex nut ground spherically as illustrated at *A* in Fig. 11. This type of nut, fitting into the angular or spherical seat, must be turned or loosened enough to clear the socket before bolt and arm can be swung out of the way.

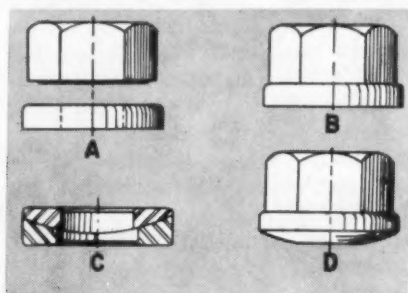


Fig. 10—(A) Hex nut and washer which can be used as clamping media for swinging bolts; (B) collared nut with integral washer for use with swinging bolts; (C) spherical two-piece washer sometimes used to center swinging bolt; and (D) hex nut with integral collar used with lower half of spherical washer or in spherical socket machined in swinging arm.

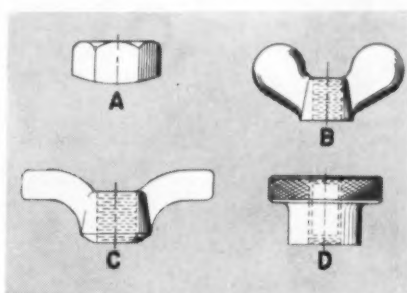


Fig. 11—(A) Drawing of hex nut, the bottom of which is spherically ground to fit into an angular or spherical seat; (B) drawing of thumb nut used mostly for small swinging bolts; (C) drawing of thumb nut of heavier design, having spherical end for clamping into socket; and (D) drawing of knurled knob used on medium duty fixtures and drill jigs.

"... horse-shoe washers have one advantage in that the nut need barely be loosened to remove the washer."

Thumb nuts are frequently used when low pressure clamping suffices. Examples are shown at *B* and *C* in Fig. 11. These nuts are purchasable, made of Tobin bronze or as steel forgings. Because the base of the body in design *B* is so small, whereby the clamping area is restricted, this type of nut is used mostly for small bolts. The design at *C* is somewhat heavier and has a spherical end for clamping into a socket. The wings have a greater span, presenting greater tightening leverage. Other wing shapes are available.

Knurled knobs of the type shown at *D* in Fig. 11 can be seen on medium duty fixtures and drill jigs.

Usually, a coarse knurl is supplied, but the knurl points are filed or ground down so as not to hurt the tender part of the hand between the thumb and first finger when the knurled knob is grasped. The knob shown at *A* in Fig. 12 is for heavier work and while knurled, it is also supplied with cross holes into which a rod can be inserted for greater leverage. The holes should be about 1/64 inch over the rod size and should be chamfered as shown so that the rod can be inserted quickly and easily. Case carburizing helps keep the holes from bellmouthing.

Nuts like the one shown at *B* in Fig. 12 have a cross pin pressed

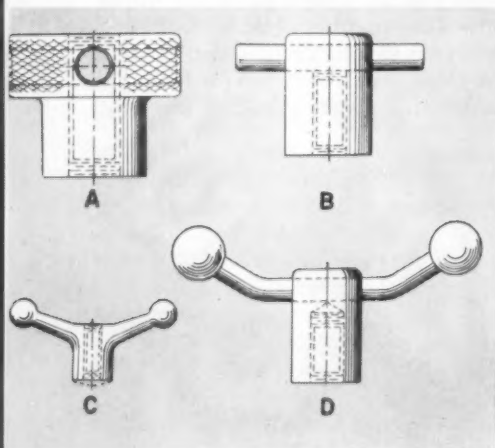


Fig. 12—(A) Knurled knob with cross holes into which rod can be inserted for greater leverage; (B) nut with cross pin for finger-gripping purposes; (C) forged handle knob for use where two hands are used for tightening purposes; and (D) handled knob having plastic balls at ends of cross handle.

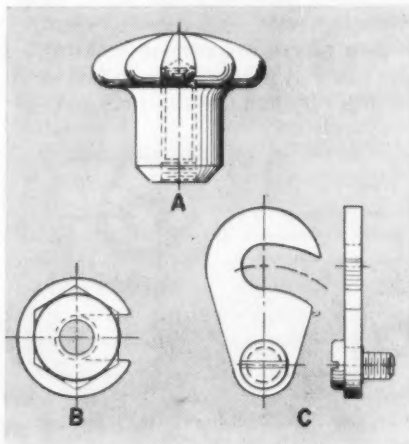


Fig. 13—(A) Drawing of hand knob which is made of cast iron and shaped to fit the palm of the hand and the fingers; (B) drawing of horse-shoe washer frequently used with swinging bolt clamp assemblies; and (C) typical shape of swinging washer sometimes used with swinging bolt clamp assemblies.

therein, the ends extending out enough so that the fingers can readily engage them. Forged handle knobs like the one illustrated at C in Fig. 12 are employed when two hands are used for tightening. This type of knob is sometimes made spherical ended as shown by the dotted lines. Larger handled knobs like that shown at D in Fig. 12 have been used which have plastic balls mounted at the ends of the cross handle. The handles of the knobs shown at C and D in Fig. 12 are left soft. The knob shown at A in Fig. 13 is made of cast iron and is shaped to fit the palm of the hand on its top surface and has six flutes and knobs to fit the fingers. Considerable pressure can be exerted with this design.

Two other types of washers should be mentioned here. So-called horse-shoe washers are frequently used with this type of clamping. They have one advantage in that the nut need barely be loosened to remove the washer. The washer shown at B in Fig. 13 is round and has a straight slot. A disadvantage is that this washer is really a loose piece, so loose that it can be misplaced or lost.

The swinging washer overcomes this objectionable feature. But now we have first to swing a bolt, loosen a swinging washer, and then throw back a swinging arm. This makes considerable swinging. However, washers of this type are used and the design at C in Fig. 13 represents a typical shape. It must be centered on a threaded stud like the one portrayed, having the body a little longer than the washer thickness. (To be continued in next month's issue)

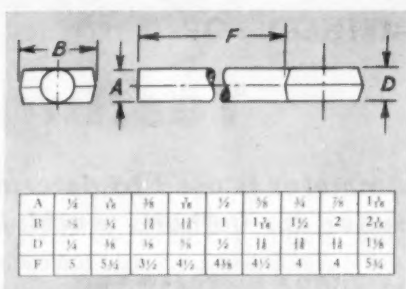


Table 1 — The dimensions in this table were selected by the author from 36 different sizes and lengths made by one manufacturer as being a representative list of rod end bolts.

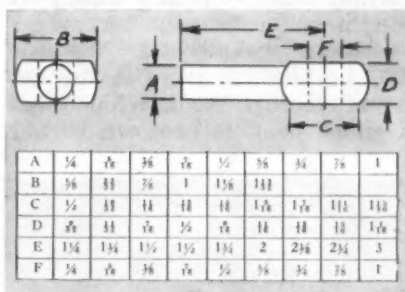


Table 2—This table lists dimensions for various sizes of rod end bolts of the type shown in Fig. 2 at the beginning of this article.

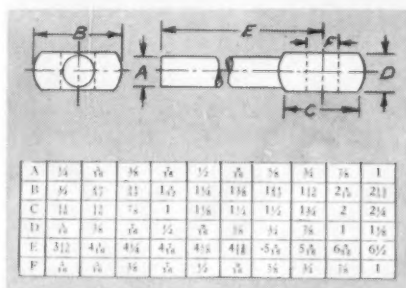


Table 3—In this particular table, the dimensions are presented for a type and style of rod end bolt which has been standardized by the Society of Automotive Engineers.

METHOD FOR

Testing Cutting Fluid

Ammeter is used to determine lubricant best suited for author's machining requirements.

By JACOB H. SPERMAN

President, Sperman Metal Specialties, Brooklyn, N. Y.

It stands to reason that if a cutting fluid is really doing its job, it will reduce the friction between the workpiece and the tool. The less friction there is, the less power required. We have found that a simple way to compare cutting

fluids is to install an ammeter in the line leading to a milling machine, for instance, and then find out with which lubricant the machine draws the least current. Of course, in order for such a test to have valid results, all other factors must remain constant. Speed and feed must remain the same, as must the type of steel being cut. Also, the cutter should be equally sharp for all tests performed.

These requirements are most easily met if various lubricants can be tested during one and the same cut; then there is no question but that any change in ammeter reading must be due to the lubricant being used, all other conditions being absolutely the same. When we tested a number of lubricants a while back to find out which would suit our operation best, we rigged up a very simple misting system on a horizontal milling machine, as shown in Fig. 1. Operated by compressed air and utilizing the syphon principle, this

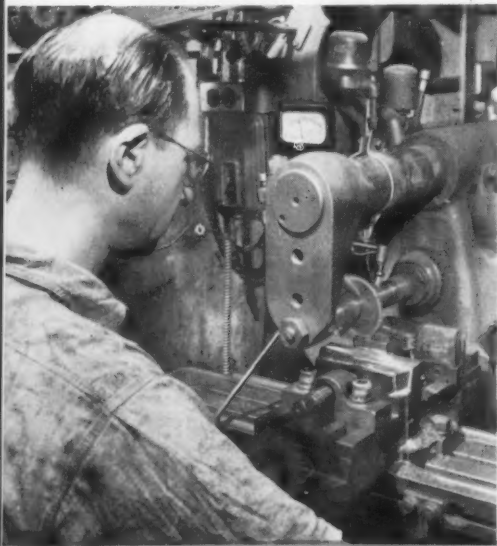


Fig. 1 — Simple mist system, installed on milling machine, supplies synthetic cutting fluid for maximum tool life and efficiency.

Effectiveness

misting device permitted us to spray any one of a number of lubricants merely by inserting the rubber suction hose in the appropriate container. For instance, when we compared a new synthetic cutting fluid with some oils we had been using previously, this is what we found: With the previous oil, the milling machine would draw about 2.8 amperes. With Dromus Oil E, the synthetic cutting fluid, the current was only 2.1 amperes, which is the no-load current of the motor.

Synthetic Cutting Fluid Offers Many Advantages

Not only did the ammeter indicate lower power requirements, but the sound of the machine seemed to confirm the greater lubricity of the cutting fluid. The finished work showed fewer chatter marks than formerly, and those which did appear were easily buffed out with a fine wire brush.

Improved lubrication at the point of cut, in addition to reducing your power costs, offers several other advantages. First of all, the tools last longer. Second, as already mentioned, a better finish is achieved.

Third, the synthetic cutting fluid does not turn rancid so that it is not necessary to clean every machine before shutting down overnight or for the week-end. A fourth advantage is that this new cutting fluid induces greater accuracy and helps to reduce rejects.

One type of gear for our stock straightening machines, for example, has to be cut on a fairly thin arbor as shown in Fig. 2; and to keep production up, we try to machine as

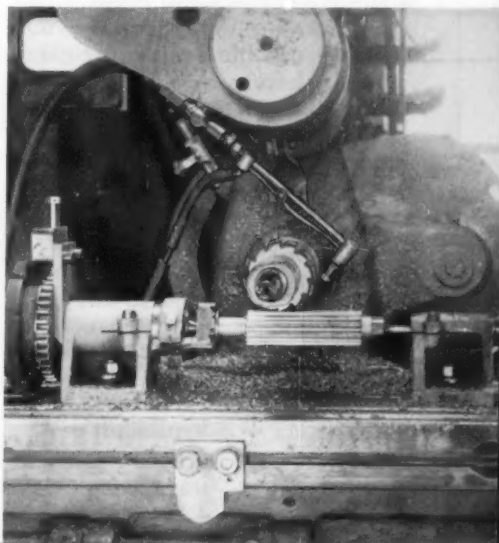


Fig. 2—Hobbing several gears at once. Cutting fluid reduces pressure of tool on the work and eliminates springing of the arbor.

"... using the synthetic cutting fluid, far less force is exerted on the arbor ..."

many gears at one clip as possible, so that the arbor is also rather long. Under these circumstances it was not surprising to find that the arbor would deflect considerably. As a result, with the previously used oils, the teeth of the gears in the center of the arbor would be incompletely formed, which would be noticed only after the gears were removed from the arbor. Because it would take too much time to set them up for re-machining, our only choice was to scrap these parts. Now that we are using the synthetic cutting fluid, however, far less force is exerted on the arbor, and it no longer deflects so much as to produce scrap.

Another major benefit accrues when we use the synthetic cutting fluid for deep-hole drilling. For instance, on one stock straightener component we have to drill a 5/32-inch hole to a depth of up to 4 inches from one side only as shown in Fig. 3. Sometimes the drill would break after only two or three holes and, because it could not be removed, would cause the entire part to be scrapped. This was particularly annoying when the hole had to be the last operation, for then it meant several wasted hours of labor. Since using the synthetic cutting fluid, drill breakage has been all but eliminated, which we feel is largely

due to better cooling and removal of chips before they have a chance to seize.

Unusual Application

Dromus Oil E is used in our shop in an application which is perhaps a bit unusual. The steel rolls for our stock straighteners, case-hardened to Rockwell C 62, have to be ground to exact size. They are 4 inches long, have a 1-inch o.d. and are press-fitted onto a 5/8-inch arbor. Formerly, we used to spread an extreme-pressure lubricant on the arbor before forcing it into the roll. Now we use a weak solution of the

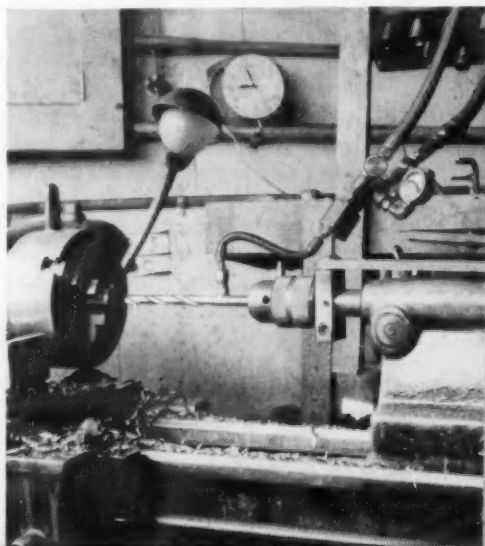


Fig. 3 — For this deep-hole drilling operation, a core drill is used and the cutting fluid forced in the hole under pressure

synthetic cutting fluid (30 parts Dromus Oil E to one part water). After one roll has been ground, we remove the arbor and drop it into the pan containing the cutting solution. By the time we are ready to use the arbor on the next piece, the cutting solution has cooled it down, lubricated the arbor and has also washed off any dirt or dust particles which might cause trouble. This is a real time-saver.

The same cutting fluid is also used in the grinding operation itself. Because the roughing cut removes between 5 to 8 mils—sometimes more because the rolls are not always absolutely concentric—the aluminum oxide (60J7) wheel which we were using dry did not last very long. After two or three pieces had been

ground we had to dress it. On the chance that the lubricant might do some good, we saturated a piece of felt with a weak (30:1) solution of Dromus Oil E and let it ride on the wheel, as shown in Fig. 4. Very little solution was used, inasmuch as the 5-oz. oil cup which keeps the felt wet was filled only once a day. And yet, the wear reduction of the wheel was almost unbelievable—55 pieces the first time we applied the cutting fluid without redressing the wheel.

★ ★ ★

The Machinist's Dictionary. By Fred H. Colvin. Published by Simmons-Boardman Books, 30 Church St., New York 7, N. Y. 496 pages. Cloth binding. Price, \$7.50.

This dictionary was compiled to present information concerning machine terms, parts and standards in a comprehensive form for quick and ready reference. Tables, charts, lists and illustrations are used to clarify and extend the information in the text. While a brief definition may be sufficient in many cases, detailed explanation has been given if it seemed necessary. Many tables of standards are included in order to save time and present all the pertinent facts in one volume for the convenience of the reader. The book is designed to be useful to men in any phase of machine building and repair—designers, purchasing agents and operations men—and has particular value to teachers and learners of up-to-date machine shop procedures.

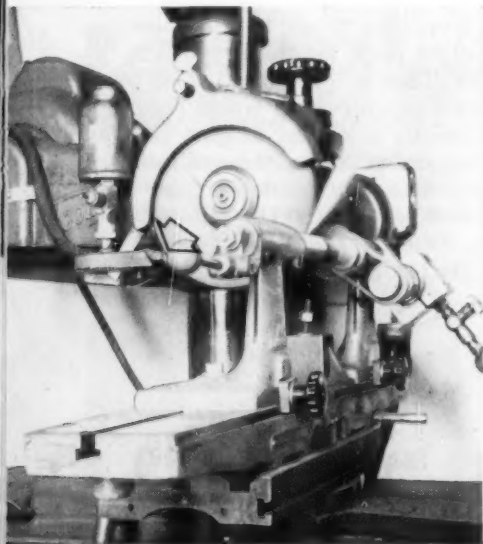


Fig. 4 — Synthetic cutting oil solution extends grinding wheel life. Note felt strip (arrow) which feeds solution to wheel.

Standard Costs in accounting for PROFITS

By JACK E. BEDFORD



How cost accounting is designed to show machine shop management the actual cost of a production order after it has been completed is discussed.

Cost accounting is not designed to show what a given production order *should* cost. Nor, is it to show the *estimated* cost of a production order. Cost accounting is designed to show top management in a machine shop the *actual* cost after the production order has been fully completed.

By giving management of a machine shop the actual costs of an order, it is providing historical information. As such it is of little value, but top management can use these facts to compare the estimated cost on a production order when it was accepted with the actual cost when the order was completed. Thus, inaccuracies in the original estimate quickly come to light and can be corrected in future estimates.

Machine shops that operate on a cost plus basis will have accurate

information to use to determine the billing price for the production order. They will be sure that all overhead expenses and fringe costs are correctly allocated to each production order. *Thus, through cost accounting, top management has a valuable tool for the following six functions:*

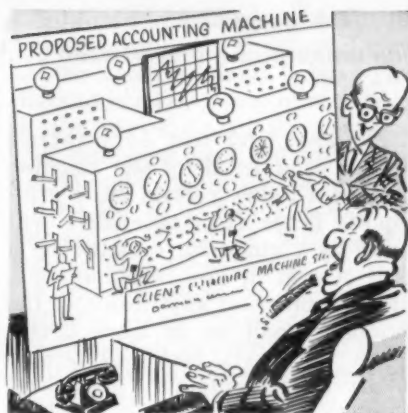
1. Budgeting
2. Establishing prices for standard production orders
3. Determining which jobs are most profitable
4. Determining which jobs cost the shop money
5. Setting a value on work in process inventories
6. Determining fair and competitive prices for special production quotations.

Operating at top efficiency, a cost accounting system will provide man-

agement with figure facts necessary for the most profitable operation. The efficiency of a cost system depends almost wholly upon the organization operating it and how the system is planned, installed and operated.

Most machine shops with efficient cost accounting systems started with a simple cost system and gradually developed and perfected it until it meets the particular requirements of the individual machine shop. In addition, it is flexible enough so that it can be changed to meet new conditions that may arise in the shop — union requirements, changes in process, and different selling methods.

In planning a cost accounting system for a machine shop, care should be taken to be sure that the system is practical. It should meet the practical requirements of the shop, and should not be set up on a purely theoretical basis. Such a procedure is usually expensive to in-



"In planning a cost accounting system . . . be sure that the system is practical."

stall and operate and may be so complicated that it will defeat its original purpose—reducing the cost of operation in the machine shop.

It is almost impossible to formulate a single cost system for the machine shop industry because different plants have different problems. A cost system that would be efficient in one machine shop handling certain types of work would not serve the needs of another shop with different production. Or a cost accounting system that would prove successful in one section of the country might not meet the needs of a similar machine shop located some place else.

Before attempting to formulate a cost system for any particular machine shop, it is first necessary to make a careful survey of the plant and develop a practical system that will meet the individual needs. Type of operation, union contract, and location of the machine shop are just a few points to be considered.



"...through cost accounting, top management has a valuable tool for 6 functions..."

"... it is necessary to establish a system that records the amount of material used ..."

However, any cost accounting system established for any machine shop will follow certain basic principles. These fundamentals will serve as a guide for establishing a cost system in any machine shop, and the practical application of the principles will be in more detail. Then, too, special forms will be necessary to accumulate the desired information for a particular machine shop.

Material purchases is one of the first considerations in a cost accounting system. This consists of all of the materials used in the machine shop. When purchases are made, an entry is made on a perpetual inventory or raw materials ledger page or card for each type of material.

For instance, many machine shops have separate inventory rec-

ords for all types of materials purchased. Some shops sub-divide this inventory record by sources of supply to provide information that will aid the purchasing department in selecting the best source for future purchases and to avoid a duplication of records in the accounting and the purchasing departments.

Next, it is necessary to establish a requisition system that records the amount of material used on individual production orders in the machine shop. These requisition forms can be separate records or they can be a part of the regular production order, depending on the needs of the individual machine shop.

When the materials have been removed from the storeroom and are put into production, some record should be made of this on the perpetual inventory of raw materials. Thus, the day-to-day balance in the inventory account will reflect the actual amount of materials in the storeroom, taking into consideration receipts and disbursements.

Periodic checking of the actual material inventory against the book inventory will insure accuracy in the cost accounting system. Some machine shops make a monthly inventory; others find that a quarterly inventory is sufficient to provide true figure facts for the cost system's efficient operation.

One perpetual problem that arises in a cost accounting system is: *What method should be used to determine the cost to use in charging*



"Material purchases is one of the first considerations in a cost accounting system."

the production account with the materials used? There are four methods commonly employed by machine shops which use a cost accounting system, and each has its merits and drawbacks.

The four methods that can be used to determine the cost to be charged to the production account are: (1) first-in, first-out; (2) average cost; (3) standard cost; and (4) last-in, first-out.

First-In, First-Out: When the first-in, first-out method is used, the material is priced at its actual cost. Requisitions are then priced at the price of the oldest stock on hand. If a requisition requires more than the balance left at the old price, the remainder is charged at the price of the next oldest stock. With this method, the book value of the materials is computed by taking the balance left at each cost and totaling the extensions.

Average Cost: Since materials are not stored on the basis of price at the time of arrival nor withdrawn on the basis of when purchased, many cost accountants in machine shops believe that the average cost system is best. With this method of valuing the inventory and the requisitions, an average cost is determined to give a book figure for withdrawals and inventory valuations.

Standard Cost: This method simplifies the bookkeeping in the storeroom and provides a check on the accuracy of the inventory. A standard cost figure is determined and all receipts and withdrawals from stores are recorded at this figure. However, with this method it is necessary to establish a sepa-

rate account to take into consideration the variations in material costs on the machine shops ledger. This account is a key to top management of the variations in the standard cost compared with the day-to-day operations in the machine shop.

Last-In, First-Out: Commonly referred to as LIFO, this method assumes that the materials on hand are those acquired at the earliest purchase date. Thus, requisitions are charged at the most recent price until the last shipment has been exhausted; then at the former price. Remaining material is assumed to be worth its first value.

Direct labor is the next cost item that must be considered in a machine shop's cost accounting system. This can be determined from time cards of the employees or special production time cards that are broken down for individual production orders. This information is accumulated and charged to the order to determine its direct labor cost.



"What method should be used to determine the cost . . . in charging . . . material used?"

"Time should be kept on each production order handled at the various points of production . . ."

Time should be kept on each production order handled at the various points of the production process. Charges are made to the order on the basis of regular time, overtime, piece work, or bonus time.

Machine shop overhead cost analysis is necessary to arrive at a more nearly accurate cost for individual printing orders. This expense will include: supervision, vacation pay, training wages, repairs and maintenance, spoiled work costs, supplies and any other expenses that are considered overhead.

To install a cost accounting system that is efficient, it is necessary to accumulate this information from the past and to determine the ratio between it and the direct labor cost. If, for instance, the shop overhead total is 25 per cent of the direct labor cost, this figure can be used as a starting point for allocating the overhead to individual production orders.

This cost should be reviewed periodically to determine whether it is in line with continued operations. For instance, if, as a result of cost studies, it is determined to discontinue one type of production which required a great deal of direct labor cost, the ratio may change. Or, if new equipment is installed that eliminates certain direct labor costs, the ratio may change. *It is important that this ratio figure be constantly adjusted in order to reflect the true picture of the machine shop's operation.*

Shop operating expenses must be allocated to production orders to give top management a complete picture of the total cost involved. This will include administrative expense, office expense, advertising, sales, and training expense.

When the actual figures for these various divisions of the operation are determined, their ratio to direct labor can be determined. For instance, if the total operation expense equals 75 per cent of the direct labor expense on the machine shop as a whole, this can be added to each production order for a complete cost.

Again, this figure must be checked. Changes in top management policy may give a different picture this year than last. When management is adjusting its operation in



"It is important that this ratio figure be constantly adjusted to reflect shop's operation."

several departments — sales, advertising and training, for instance—a review of this ratio to actual current figures would be made at least quarterly and probably monthly to give a more accurate picture of this expense element.

Thus, through an analysis of these individual production orders, it is possible to determine a standard cost for any type of machine work turned out by the shop. It will be possible to quote standard prices quickly and easily without fear of loss on handling the order.

Then, too, orders that are accepted on a highly competitive basis may be passed up because they will not meet plant costs. *Armed with the facts that a cost accounting system provides, a machine shop has executive tools to decrease costs and increase production and profits.*

Specifically, top management in a machine shop can use cost accounting figures to:

1. Reduce the cost of materials

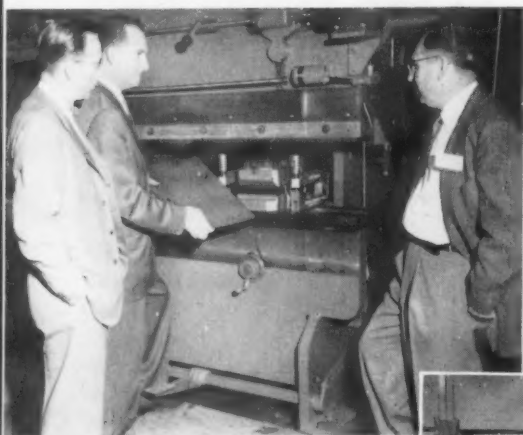


"Armed with the facts . . . a machine shop has executive tools to decrease costs . . ."

and the time wasted at certain points of the production process.

2. Better place manpower where it will be most productive for the machine shop.
3. Eliminate entirely any unnecessary labor and inefficient service.
4. Compare the profit possibilities of different types of equipment for different production jobs.
5. Determine the maximum capacity of the machine shop to handle a large rush order on a profitable basis.
6. Know which production jobs are most profitable so that they can be promoted more aggressively.
7. Discover unprofitable jobs so that they can be eliminated or the prices adjusted to provide an adequate profit for the machine shop.
8. Purchase supplies and materials at the best price to increase the profit.
9. Know the inventory valuation of the materials to serve as a guide in future buying in different markets.
10. Know which employees in the machine shop are profitable and which are a burden to the business.

Figure facts obtained through a cost accounting system for a machine shop are historical. However, with good top management appraisal, these figure facts can come to life and accordingly provide guide posts for future profitable and competitive machine shop operation.



(Left to Right) J. R. Longwell, Field Engineer, The K. O. Lee Company; Jerome F. Ferdinand, Sales Manager, The Punch Products Corporation; and Emil Gutman, Field Engineer, The K. O. Lee Company.

Random of ASTE

Lloyd C. Bigelow, Vice President, Boice Gages, Inc., at right, explains the positive centralizing head feature of the new Boice Model 1 Small Diameter Bore Gage to T. Russell, General Foreman at the Melrose Park plant of International Harvester Company.

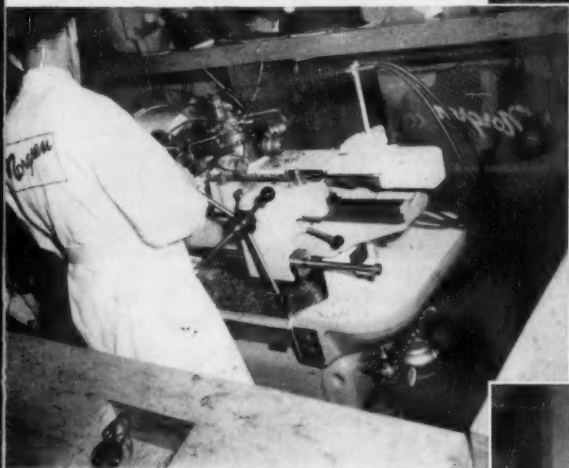
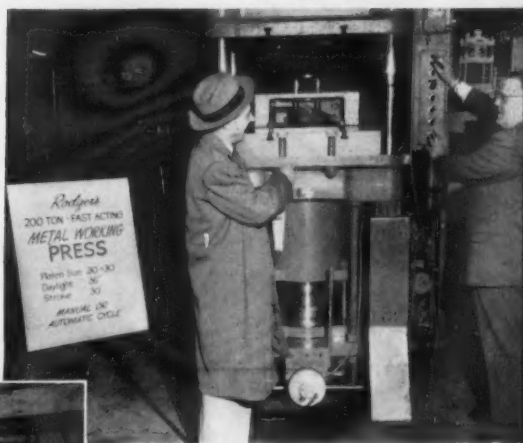


Harry Dixon, Sales Department, Equipto Division of Aurora Equipment Company, explains versatility of drawer from "Little Gem" tiny parts cabinet to Edmund J. Czopar, Assistant Superintendent, and R. J. Lesnik, Chief Engineer, of Gorham Tool Company. Two men at left are G. W. Jankowskie, Mechanical Engineer, Bridge and Tank Company, and Ralph Zettinger, Sales Department of Equipto Division.



Photos Booths

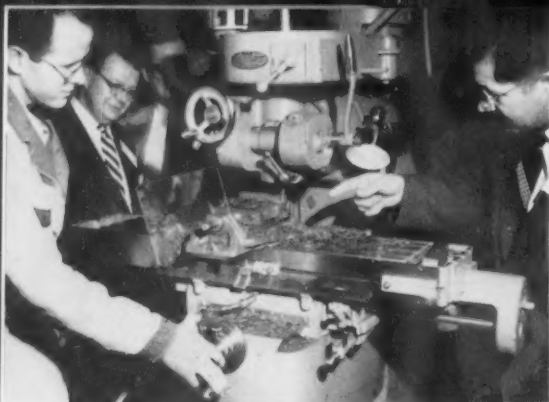
Albert F. Pretz, Tooling Superintendent, International Oil Burner Company, watches D. W. Penwell, District Manager of Rodgers Hydraulic, Inc., Minneapolis, demonstrate operation of new Rodgers 200-Ton Fast Acting Metalworking Press.



James Carson, Machine Operator, C. A. Norgren Company, demonstrates metal cutting operations on a Brown and Sharpe No. 2 Hand Screw Machine having Norgren Centralized Micro-Fog Lubrication and Spray-Lube System.

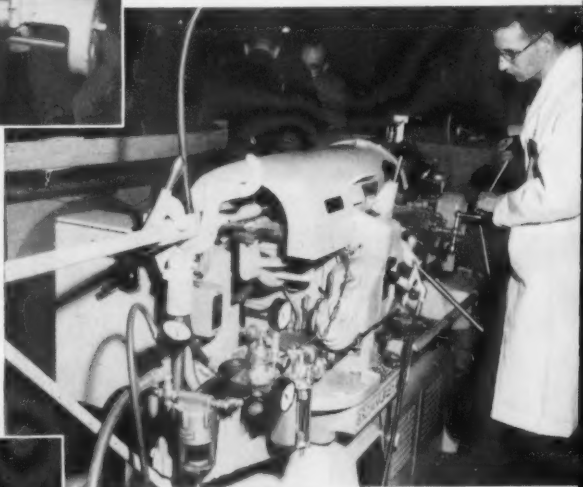
Norman Barndt (Right) Sales Manager, R and L Tools, explains features of expanded line of tools for screw machines and turret lathes to Patrick J. Petrucelli, Chief Engineer, Westfield Metal Products.





(Left to Right) Alfred Carter, Operator, Schmarje Tool Company; C. Krueger, Engineer, Gairing Tool Company; J. Miller, Process Engineer, Gairing Tool Company; C. F. Schmarje, Manager, Schmarje Tool Company. Demonstrating cutting capability of left hand spiral fluted carbide tipped end mill from line of tools made by Schmarje.

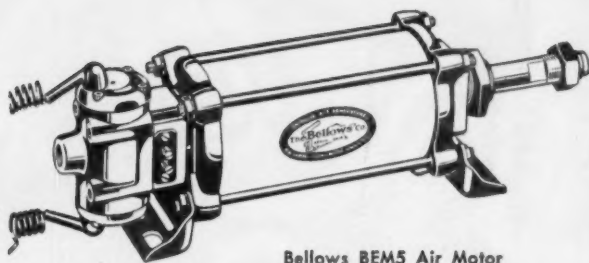
View showing Norgren Centralized Micro-Fog Lubrication System equipment on a Brown and Sharpe No. 2 Hand Screw Machine. This equipment is designed to provide 200 bearing-inch lubrication to various components of the machine.



Demonstrating the use of new Hammond Oscillating Carbide Tool Grinder to A. L. Dery, President, A. L. Dery Manufacturing Company is Russell Borst, Chief Inspector of Hammond Machinery Builders, Incorporated.

Demonstrating the strength of Scott Wipers. Shown herewith is a five-pound tray of metal parts being suspended between two-hand grasp of oil saturated Scott Industrial Wiper.





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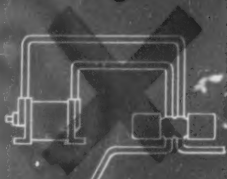


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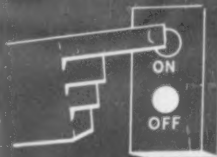
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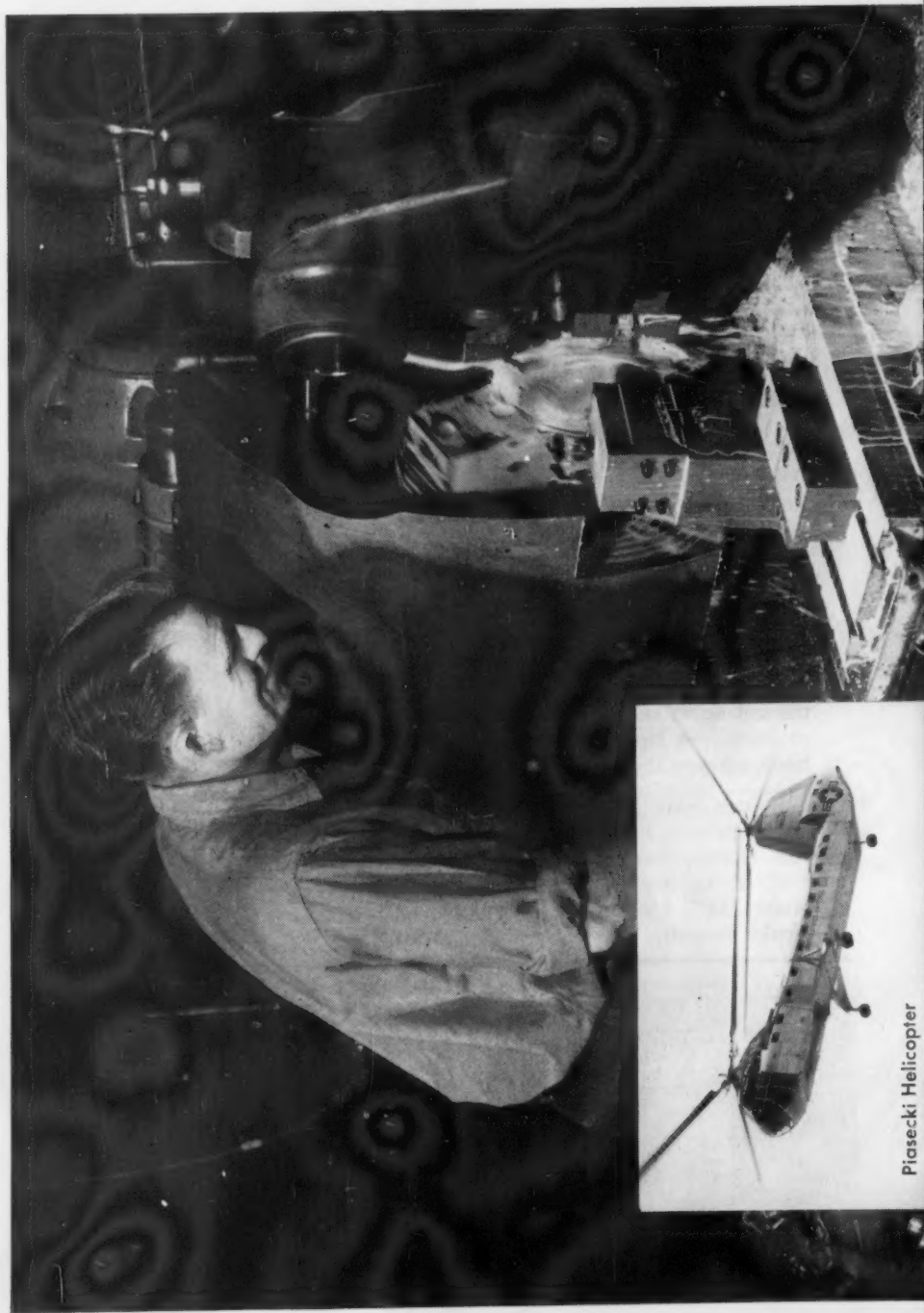
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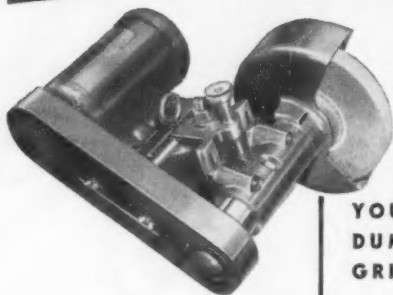
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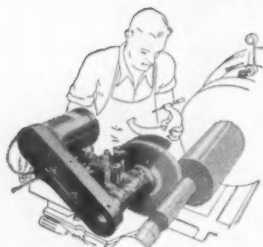
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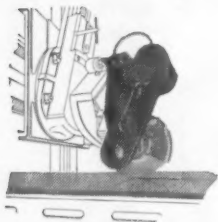
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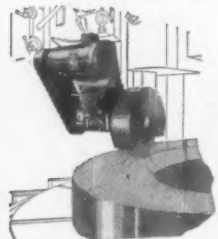
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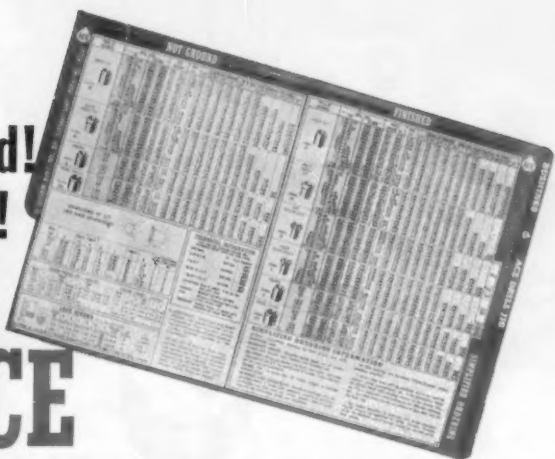
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Visualizing Plant Layout in 3 Dimensions



***If you are interested in efficient layout planning,
here are some suggestions that will help you
save time and money.***

By H. H. DASEY

President, "Visual" Plant Layouts, Inc.

Top management today is becoming deeply concerned with the shortcomings and confusion existing in plant layout techniques. In a widely organized and engineered industrial economy such as ours, it seems strange that our great emphasis on standardization of procedures has more or less been ignored in one of the most important phases of this industrial economy.

That phase, specifically, is the standardization of industrial planning techniques. These techniques, the initial starting point of any industrial effort, must be planned in advance of their operation, and expenditures of millions of dollars rest directly on these planning results.

All too many cases, unfortunately, because of unstandardized and unintegrated planning techniques, mistakes are continually being made in the base planning. Such mistakes, in a skyrocketing material, tool cost and man-hour market, are burdening management with excessive, penalizing and unforeseen costs.

Since such a situation exists, there must be a basic fault or reason for it. There unquestionably is a fault, and that fault is the lack of organization, the lack of standardization in planning techniques. The reason for the fault's existence is two-fold:

(1) The general ignorance, in management and engineering alike, of the responsibilities involved in the

very broad term "plant layout."

(2) Management's reluctance to establish suitable and standardized planning procedures and techniques, and to permit the purchase of the equipment necessary to further these procedures and techniques.

It may sound like a strange indictment of management to say that the engineering planning department, or the plant layout department, is the only department in industry today which is forced to make its own tools.

If we can demonstrate the need for a \$20,000.00 machine, management will buy it. If we need a screw driver for the maintenance electrician, management will also buy it. But if we need planning equipment to insure the success of proper planning methods for a ten-million-dollar plant, management may decline to buy it.

In order to draw a fair comparison between the various types of planning techniques and the materials or equipment required, let us leave the question or the decision of what these techniques should be until a later time, because these techniques and methods should be determined by the burden or the responsibilities required of them. Obviously, we would not need a five-ton truck to haul five pounds of feathers; on the other hand, neither could we handle locomotive boilers in a wheelbarrow.

The planning for any type of industrial manufacturing space is in no basic sense different from the planning or composition requirements of art, literature or music. In each of these separate though related categories, the division of

space along predetermined functional lines, based on the categorical demand load of each operation, or movement, is identical. The space-composition breakdown for manufacturing also follows a mathematically determined course, based on:

(A) Type of product that is manufactured.

(B) Material from which it must be processed.

(C) The methods through which it will be manufactured.

(D) The types of equipment necessary to its manufacture.

The type of product will, to a major degree, determine the overall space requirements of the plant. Obviously, one cannot manufacture locomotives in the same space in



Templet layout is quick method for getting final print — no drawing time is involved.

"The layout and planning group is faced with the job of composing the manufacturing space or layout."

which hooks and eyes would be made.

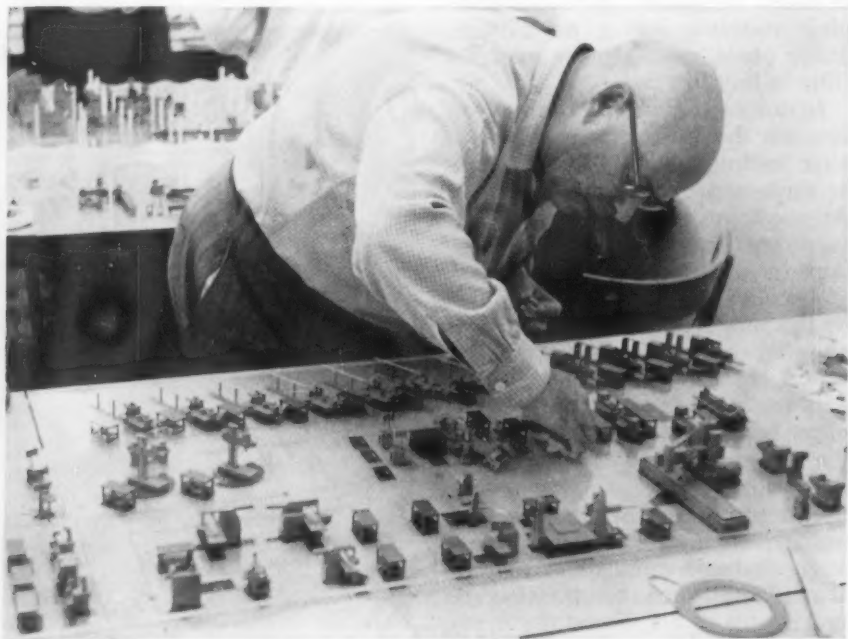
The layout and planning group, armed with information as to type of product and material to be used, is faced with the job of composing the manufacturing space or layout.

First comes material. Prime questions are: "How much space will be needed for incoming material?"; "How will it be handled?"; "What are the storage conditions necessary to its proper care, i.e., moisture, dryness, temperature, and so on?"

The quantities of this incoming

material are dependent upon the amount of units to be produced. Other factors include distance which material is to be shipped and the delivery time required, and also the availability of the material itself in the open market. For instance, it will be necessary to carry a greater on-the-ground stock of materials which are spotty in supply, hard to get because of rigid specifications, or whose source is so far removed from the plant that extraordinary stockpiling is necessary.

Therefore, the space relationship



Individual engineer can work on different departments and then combine later for final study.

"If sequence has been broken down sufficiently, equipment necessary to properly process material can be accurately determined."

problem for the storage, care, and handling of incoming material is of extreme importance in the space layout.

Next comes the manufacturing space requirement where the actual production elements "chew up" this raw material and produce a fabricated or finished product. If the operation sequence has been broken down sufficiently, either through experience or through extremely good planning, the number of machines or pieces of equipment necessary in order to properly proc-

ess the material can be very accurately determined.

Secondly, if through experience or a close examination of the manufacturing problem, flow lines have been set up to determine the step-by-step progressive manufacturing sequences, this tends again to simplify the arrangement of the predetermined amounts of machines, tools, finishing equipment, and so on. Therefore, the equipment arrangement within manufacturing areas can be fairly well established.

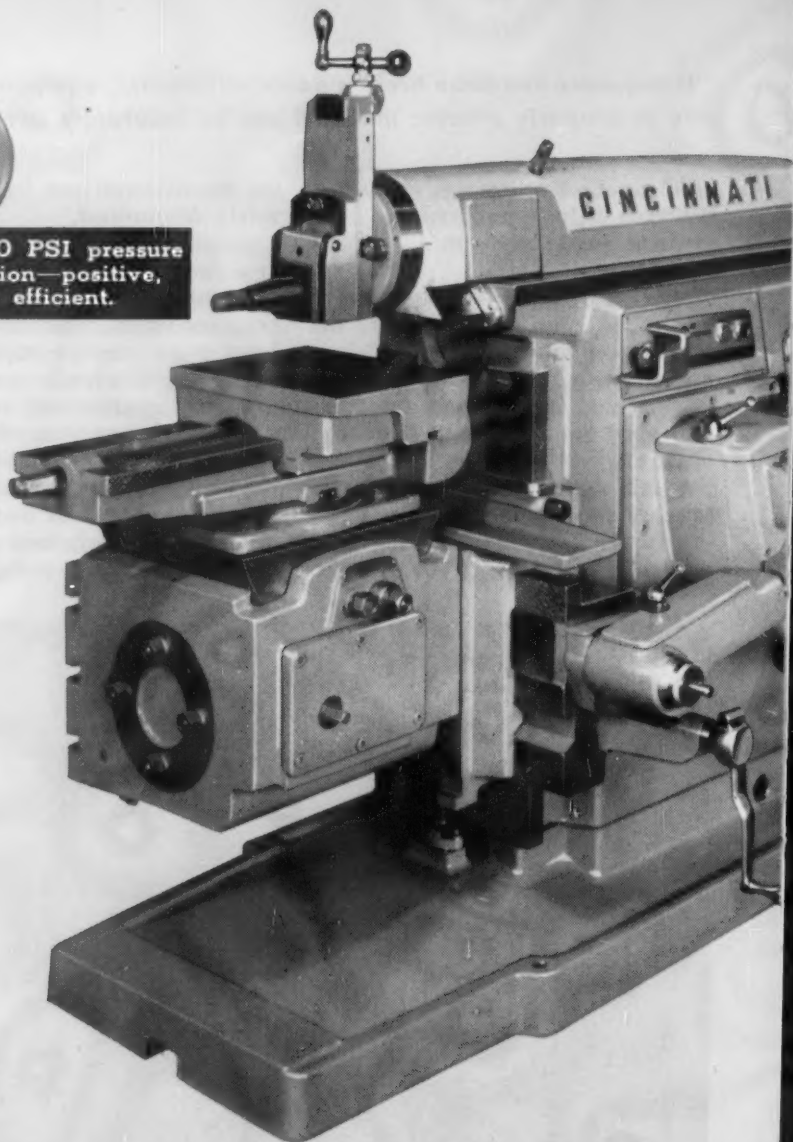
There are many things, however,



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"... handling of materials and parts in process is the most important single operation in the plant."

that will determine the amounts of space allocated to each machine or each part of the processing effort. Space requirements are different if, for instance, material and parts in process are handled on hand trucks or on skids with powered handling equipment. Naturally, a great deal more space will be required because of the additional traffic requirements. If, on the other hand, the manufacturing area is completely conveyORIZED to such an extent that truck handling is not required except possibly in a few instances, the actual manufacturing space can be reduced substantially.

It is a matter of record that the handling of materials and parts in process is the most important single operation in the plant. Duplication of handling or wasteful handling techniques can result in costs as high as 35 per cent of the total cost of the manufactured product.

Every plant has a problem with floors, aisles and doors. Aisles are never wide enough or kept clear. Floors never seem to have the proper surface or, if multistory, never enough allowable loading capacity. Doors seem to be the target for truckers, or the bottleneck that prevents material movement. These problems can be greatly alleviated if the material-handling manager compares notes with the planning engineer before plants are laid out. By discussing together the volume of traffic anticipated, the kind of equipment to be used, the size and weight

of loads, and the direction and frequency of movements, the best thinking can be incorporated into the plan. The planning engineer may be forced to select a certain kind of floor construction to meet the requirements of a process. This may not be the best from a traffic standpoint. The material handling manager can compromise on wheel loading, type of wheels or tires, and limit size or loads, or make other adjustments necessary to making best use of the floor available.

On the other hand, if there are no limitations from other sources, the planning engineer can provide a floor best suited for the traffic loads desired. The same is true for aisles, doorways, ramps and elevators. If the material handling manager and the planning engineer discuss these matters, the chances are good that the plant will have aisles of sufficient width or at least aisles which can be adapted by employing one-way traffic systems. These discussions will reveal the required heights and widths of doors, and whether some self-actuating devices are needed. Most of them may be of overhead type for space efficiency and safety.

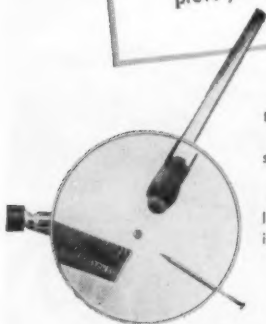
Proper planning will allow the trucks to negotiate the ramps with full load. Perhaps the elevator will accommodate the truck and load and be fast enough to handle all the interfloor traffic. If conveyors are used, the elevator may be equipped with a spur section so that the operator can load and unload from the



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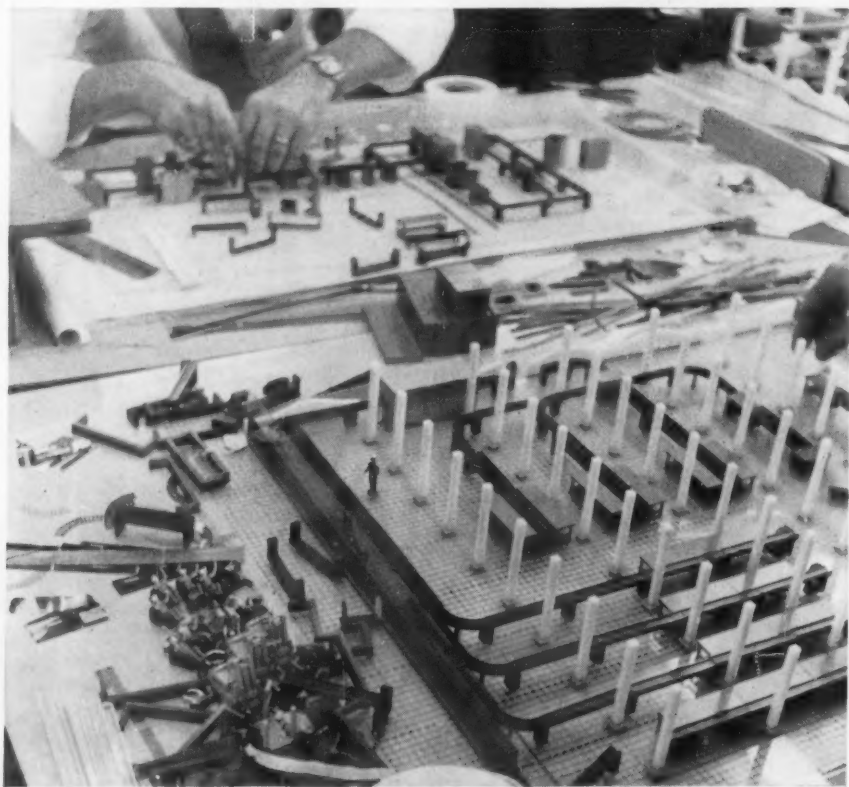
For more data circle 302 on Reader Service Card

"... maintenance men have hung monorails from roof trusses and thus caused the roof to collapse ..."

conveyor systems on the various floors without aid. This may seem visionary but, in reality, there is no reason why it cannot be done.

Not all plants move material on the floor; a great many of them use overhead equipment. Much of this equipment is suspended from the building structure, usually the roof truss or the floor girder of upper

floors. There have been cases where maintenance men have hung monorails from roof trusses and thus caused the roof to collapse because the building was never planned to take such loading. Actually, it costs very little more to strengthen building structures to take the added loads superimposed by material handling equipment, if this is incorpor-



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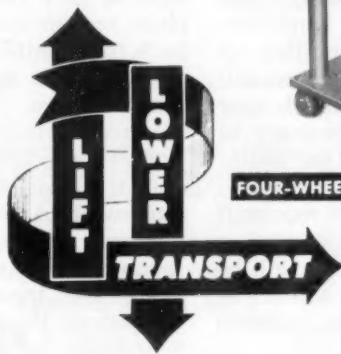
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5604

For more data circle 303 on Reader Service Card

"... a very efficient and functional building design is much lower in cost than a patched-up job later."

ated into the original design. If the material handling manager will advise the planning engineer of anticipated installations, a very efficient and functional building design is possible, practical and much lower in cost than a patched-up job later.

How will the product of the plant be shipped to customers?

By rail, common carrier truck, customers' truck, parcel post, air freight, water? How much of each? Are packing facilities required? What kind? Is a box shop required, lumber storage, carton storage? Will palletized loads be handled? Will depressed docks be needed, crane service, conveyors? Is a temporary warehouse needed for building up loads? What rail connections will the plant require? How much spur or siding? Will it be necessary to load or unload cars out of the weather? Should cars be in a depressed well? Are crane facilities required? How many cars must be spotted at one time? What size of cars will be handled? Will spotting or shifting be required by other than railroad crews?

This brief look at the complex mechanical requirements will indicate the job facing the layout engineer, whose responsibility is not only to determine the answer to these mechanical questions but also to produce a proposed layout for approval in such a manner or method that these answers will be illustrated clearly, concisely and require no translation. Thus arises the prob-

lem: What type of layout will encompass these facts best?

We then come to the human complement and the space requirement necessary for maximum individual efficiency. A man operating a drill press, for example, will normally require about nine square feet of space at his workplace. For the purpose of discussion, we will call this the operator's-work-space-requirement. If he stands in one place all day, performing or duplicating a certain operation through the hours of his employment, and does not travel about the plant or does not have to walk from machine to machine or from machine to bench and back to machine, we can safely say that the nine square feet is a reasonable figure.

Unfortunately, however, the worker's productive space is probably the least of his space-need requirement. A worker works at his machine, and *that* is his basic space requirement.

However, the worker also at times throughout the day must go to the washroom, and he therefore must be allocated so many square inches of washroom space. At times he must also wash his hands, comb his hair, make a trip to the Coca-Cola machine, eat his lunch, change his clothes, and for one reason or another may go to the medical department in the normal course of his work day. All this space must also be considered in initial planning.

In addition, the worker must

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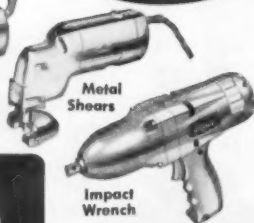
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Impact Wrench



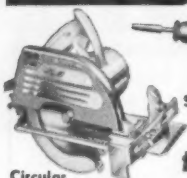
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For more data circle 305 on Reader Service Card

"... worker must be protected from heat and cold."

be fully protected from too much heat or too much cold; must be provided with satisfactory lighting conditions, and must have adequate records kept of his physical, mental, productive, and psychological fitness.

Specific items in this rather imposing list of space-consuming activities necessary to the proper maintenance of the individual worker are a great many times overlooked in properly planning or composing the space needed for the satisfactory operation of a plant.

(To be concluded in next month's issue.)

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Machining Stainless Steel

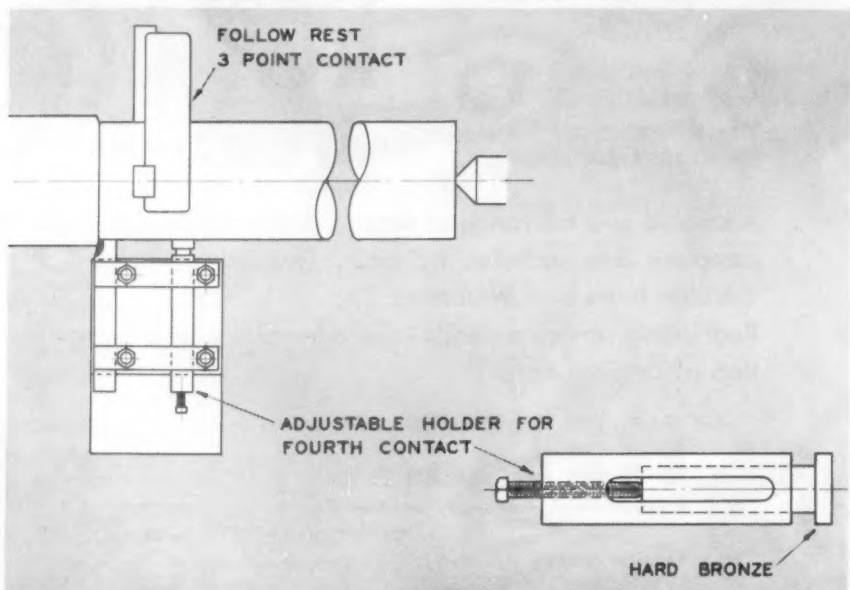
A case history pointing out how difficulties were overcome in turning hot-rolled stainless bar stock.

By G. J. STEVENS

Machining Engineer, Armco Steel Corporation

Problem: A shop was having trouble turning hot-rolled stainless bar stock. Scale and imperfections expected in this type of material caused a bump and shock that chipped the carbide turning tool. A conventional follow rest with three hard bronze rests was being used.

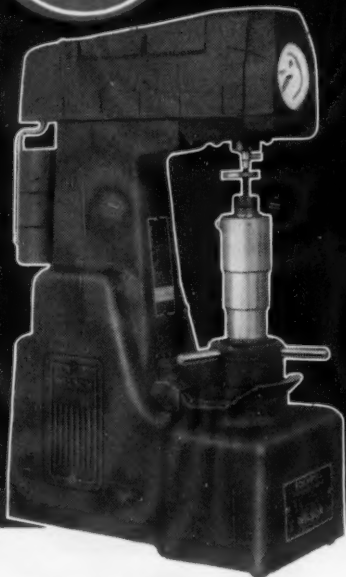
Solution: An additional follow rest was improvised from a follow rest arm and mounted parallel with the turning tool, as shown in the accompanying sketch. This fourth contact absorbed any intermittent shock and effectively protected the carbide tool against possible chipping.



Setup devised for eliminating difficulties in turning hot-rolled stainless bar stock.



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Stake Notching Projectiles

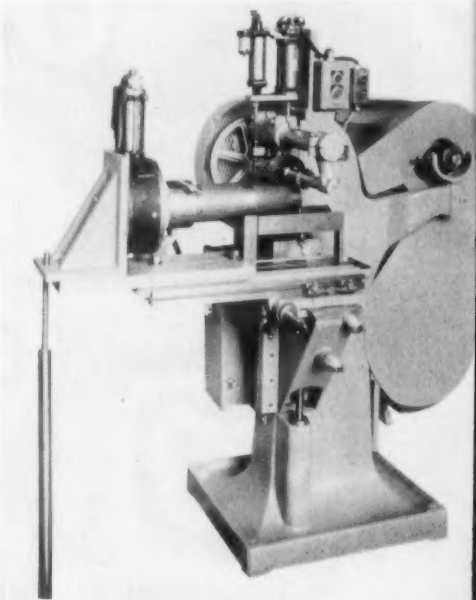
Mill is adapted for performing operations on a production basis.

Equipped for automatic feeding and indexing, the U. S. No. 1 Milling Machine shown herewith, product of The U. S. Burke Machine Tool Division, Cincinnati 27, Ohio, is being used for the semi-automatic stake notching of 105 mm. and other projectiles on a production basis. The head of the machine is equipped with a 4-inch stroke air-hydraulic feed, which provides rapid traverse approach, controlled cutting speed and distance, and automatic rapid return.

The projectile is held in a "cup type" holding collet, secured to the center of a pneumatic rotary table. The pneumatic rotary table is equipped with a 5-division index plate, and its operation is coordinated by the use of limit switches with that of the head feed.

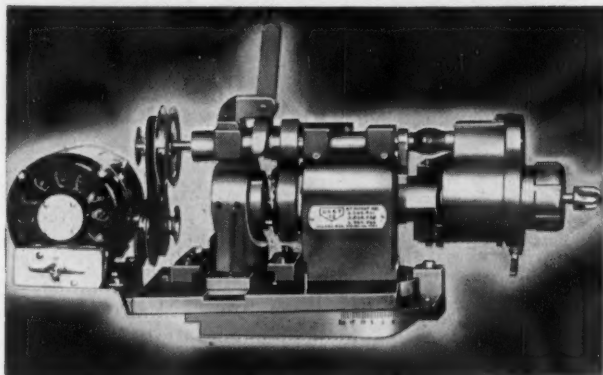
The sequence of operations is as follows: The projectile is moved from the factory conveyor line into the grooved fixture provided, and is slid into position in the "cup type" collet. A partial turn of the locking handle secures the projectile in place. The operator presses the starting button to mill the first stake notch. At the conclusion of the milling stroke, the head retracts rapid traverse, and the rotary table indexes to the next position. The head again descends, and the operation continues automatically until all five notches are properly milled.

At the conclusion of the milling operation, an externally mounted dog, located on the periphery of the rotary table, trips a limit switch, which keeps the head in a raised position, awaiting the insertion of the next shell. A "pawl lever" and locating pin mounted in the grooved fixture serve to locate the nose of the projectile in the event that all projectiles are not of the same length.



The setup shown herewith allows for the semi-automatic stake notching of 105 mm. and other projectiles on a production basis.

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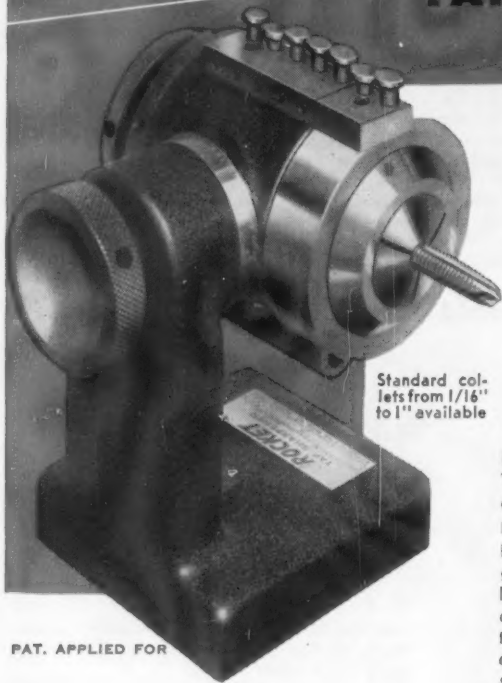


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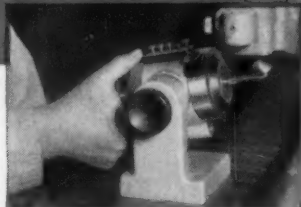
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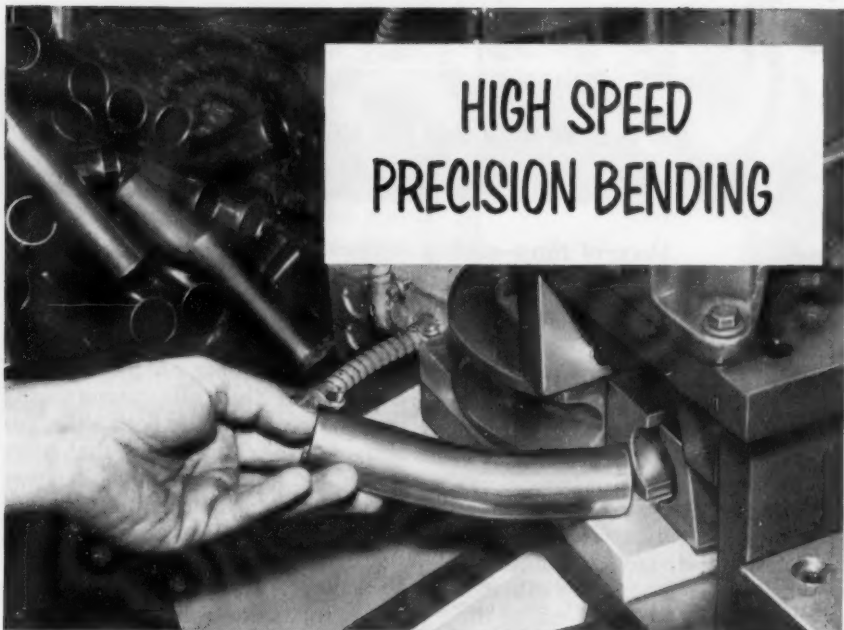
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modern machine shop 159

ideas from readers

Several time-saving suggestions for the man in the shop.

Gage for Inspecting Angular Cutters

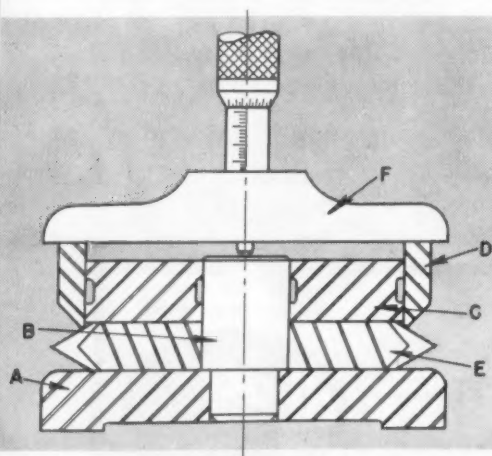
By H. J. GERBER

When making production runs of angular milled surfaces in the form of vees (for machine tool ways, and so on) the cutters are often ganged to cut several of these vees in one pass. In order that dull cutters can be replaced on the arbor and lined up exactly with the previous vee position without changing

the spacing collars on the arbor, it is essential that all cutters being used be ground with both sides exactly central. This means that some inspection procedure must be carried out during sharpening to insure this condition. The gage shown in the accompanying sketch is designed to accurately and quickly indicate any error in centrality.

The gage is easily made and is supplemented with a standard depth micrometer, *F*, to take the measurements. Four parts are required; namely, base plate *A*, a stud *B* to fit closely in the arbor hole of the cutter *E*, a spacer *C* and a gaging ring *D*. All of these parts are made of tool steel and hardened and ground or lapped to required accuracy on the mating surfaces. It is also possible to make all of these parts of mild steel and then carburize, harden and grind them.

The gage is used as follows: The cutter *E* is slipped down over the central stud *B*. The spacer *C* is fitted onto the stud on top of the cutter, and then the gaging ring *D* is slipped over the spacer with its lower edge contacting the teeth of the cutter. A micrometer reading is then taken from the upper edge of



Sketch of gage for checking angular cutters.

the gage ring to the precision ground top surface of the central stud. This reading is then recorded and compared with another reading, taken in the same manner, from the teeth on the other side of the cutter after the cutter is turned over. If these two readings are not identical, the cutter will have to be reground to take more material off the teeth on the side which has the largest of the two micrometer readings.

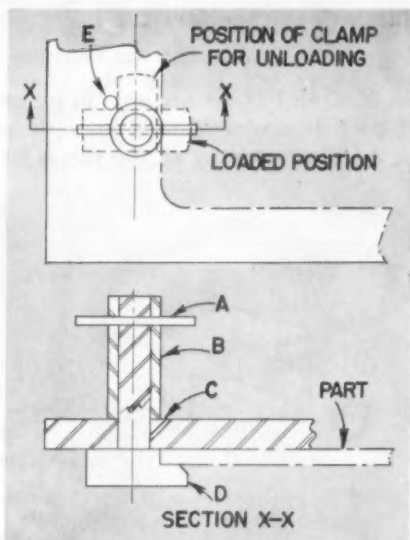
All parts of the gage must be very closely fitted, and it is suggested that they be lapped after grinding. While this gage was intended primarily for checking double angle cutters, it can also be used to check single angle cutters in case it is required to have two cutters of exactly identical size for interchangeability on a production job.

★ ★ ★

Swivel Type Part Retainer for Fixtures

By CLIFF BOSSMAN

In many instances where a part must be loaded under a fixture base, as indicated in the accompanying sketch, some provision must be made for retaining the part. This problem can be easily solved by using a retainer of the type shown at *D* which is arranged to swivel in the fixture base *C*. A bushing, *B*, is slipped over the shaft of the retainer and a dowel pin, *A*, is pressed through a hole drilled through the bushing and retainer shaft as shown. The dowel pin not only holds the assembly together but also serves as a handle for swiveling



Sketch of swivel type part retainer for use with various types of holding fixtures.

the retainer when loading or unloading parts. A stop pin, *E*, is provided to prevent the retainer from being swiveled beyond the proper position in loading and unloading parts.

This swivel type retainer has been successfully used on many welding fixtures and is believed to have many other applications.

★ ★ ★

Compound Forming Die

By FEDERICO STRASSER

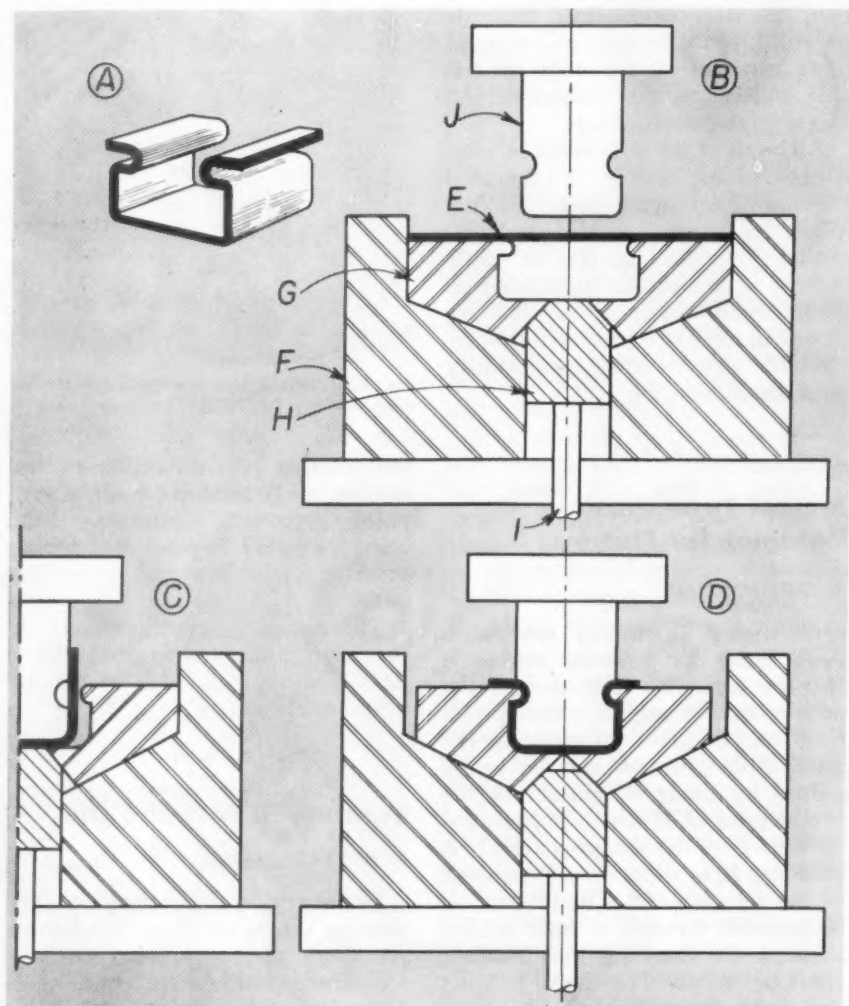
Formerly, a workpiece of the design shown at *A* in the accompanying sketch required a couple of forming operations for completion. Now, however, with the aid of the relatively simple forming die shown

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at B, C and D, we are able to make a part in one compound operation.

As illustrated at B, the die is in

the open position, with a flat blank, E, placed therein. The die consists of two stationary sections, F, two slides or movable die sections, G, and a wedge, H. The latter is actuated by a strong spring (or hydraulic cush-



Sketch showing cross-sectional views of forming die for producing workpiece shown at (A).

ion) through the medium of two pressure pins, *I*. The design of the die is such that taper-bottom slides *G* are able to move horizontally in or out of the die on the correspondingly tapered body sections, *F*, depending upon which of the two forces is greater—the upward acting cushion pressure or the downward acting press ram pressure. The punch *J* is of solid construction with two lateral longitudinal grooves.

To use the die, a blank *E*, is inserted into the open die between the two stationary sections *F* and the press is actuated so that the punch *J* begins its descent. As the punch contacts the blank, it first forms the blank into a U-shape around the upper rounded projections of the slides *G*, bottoming the blank against the slides and the top flat surface of the wedge *H*. Continuing in its downward travel, the punch forces the slides *G* downward, which action,

in turn causes the wedge *H* to descend. Thus the slides *G* close the workpiece around the punch as shown at *D*.

As soon as the workpiece is completely formed, the punch begins to ascend, thus enabling the wedge *H* to rise and force apart the slides *G* so that the workpiece is freed from the projection of the slides. As a re-

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sult, the workpiece can be readily withdrawn from the die by the punch *J*. When the punch has ascended to its uppermost position, the finished workpiece can be removed from the punch by pushing it horizontally.

★ ★ ★

One-Hand Operation Tongs for Handling Shafts

By WALTER STRIKE

Originally designed for use in dipping $3\frac{1}{2}$ -inch diameter shafts of 20-inch length into rust preventive solution, the self-opening tongs shown in the accompanying illustration can be used for many jobs throughout the average shop. Since the shafts described weighed well over 50 lb. and because the solution rendered them slippery, the tongs were designed to increase production, increase safety and reduce operator fatigue. Intended for a one-hand operation, the tongs are so

made that a downward pressure by one hand opens up the tongs to release the load.

Referring to the illustration, a ring, *A*, is welded to the top of the pipe handle *B* to allow for insertion of a hoist hook in the event power lifting is desired. The two hooks *C* and *D* are lined with brass strips on the inside surfaces *E* to prevent marring of the highly finished shafts. The brass strips are brazed to the steel hooks.

The construction of the tongs is rather simple. The hooks are flame-cut or sawed of plate stock and drilled for the four hinge pins *F*. The link *G* is made of bar stock. A stop block, *H*, is welded to the lower part *I* of the handle to prevent the use of the tongs on shafts that are small. This block is important since the linkage design without such a block would permit the tongs to open again if an attempt were made to pick up a shaft with too small a diameter.

★ ★ ★

Work Sampling. By Ralph M. Barnes. Published by Wm. C. Brown Co., 215 W. Ninth St., Dubuque, Iowa. 265 pages. Price, \$5.75.

This volume explains how sampling may be used for measuring work as well as for measuring delays of men and machines. The basic concepts are presented in simple readable form and then cases and specific applications are included as illustrations. There is also a report of research in work sampling conducted by Ralph M. Barnes at the University of California, as well as reports of research in this field conducted by other individuals.

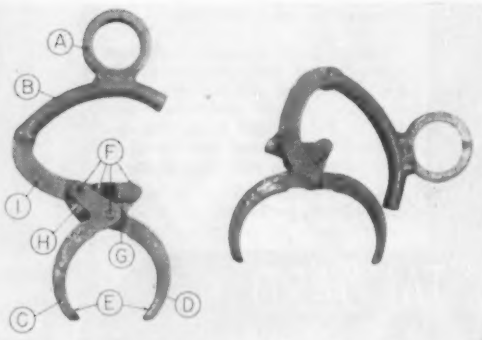
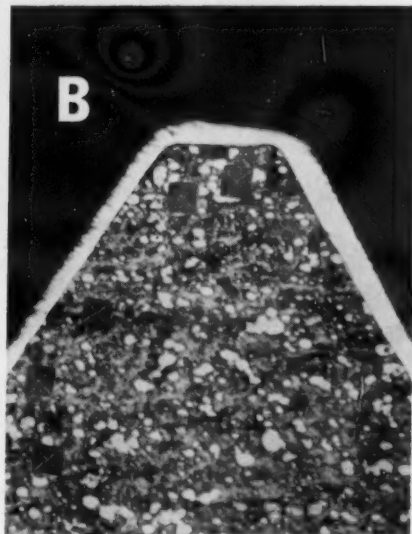
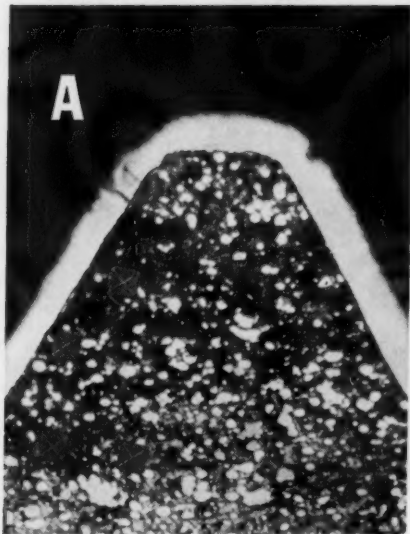


Illustration showing one-hand operation tongs in closed position (left) and open position

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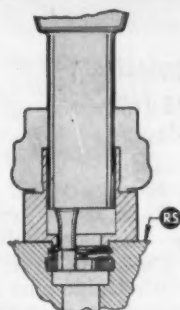
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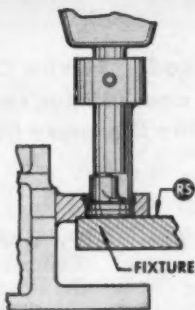
164d modern machine shop

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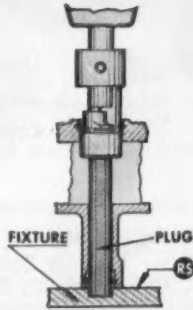
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WE ARE PROUD TO PRESENT THE LATEST
ADDITIONS TO OUR COMPLETE LINE OF
GROUND THREAD TAPS...

SPIRAL TAPS

THE MOST COMPLETE LINE...

REGULAR STYLE—#4 thru 5/16". This is the general purpose spiral fluted tap, primarily for use in blind holes in non-ferrous materials. It cuts reliably close to size.

HOOK STYLE—#4 thru 5/16". The increased hook at the cutting face and a narrower land make this style more free cutting. Desirable for bar-stock aluminum and diecast alloys.

THREE FLUTE STYLE—1/4" and 5/16". This is a stronger construction than the two flute style and is recommended primarily for steel.

DOUBLE SCOOP STYLE—1/4" and 5/16". This unique construction combines a narrow land, hooked cutting face, maximum flute area and chip-breaker effect. Specially developed for deep blind holes.

"elektra LUBE" A PERMANENT SUPER-LUBRICANT

The elektra LUBE process imparts a thin ductile deposit which acts as a permanent super-lubricant which imbeds itself into the microscopic pores of the ground tap, resulting in a smooth burnished surface which becomes an *integral* part of the tap.

High pressures at A and B force out conventional lubricant. elektra LUBE takes over at these critical points and provides *permanent* super-lubrication.



SOSSNER TAP & TOOL CORPORATION
29 BROADWAY, LYNBROOK, L.I., N.Y.

Inquiries from representatives and distributors are invited.

For more data circle 317 on Reader Service Card

57. Retainer Plates

Richard Brothers Punch Division, Allied Products Corp., Dept. 80, 12625 Burt Rd., Detroit 23, Mich. Special retainer plates, punches and dies.

58. Wipers

Scott Paper Co., Dept. 3-MM, Chester, Pa. Disposable wipers in two sizes.

59. Optical Comparator

Covel Manufacturing Co., Benton Harbor, Mich. Optical comparator which permits use in bright light.

60. Tool Bits

The duMont Corp., Greenfield, Mass. High speed, ground square and rectangular tool bits.

61. Toolholders

Vascoloy-Ramet Corp., 862 Market St., Waukegan, Ill. Toolholders and carbide inserts.

62. Live Centers

Melin Tool Co., Inc., 3373 W. 140th St., Cleveland 11, Ohio. Howard live center with back-up-ring.

63. Protractor

K-P National Sales, 1036 Terrace St., Muskegon, Mich. Precision bench-type protractor.

64. Shelving

Hallowell Division, Standard Pressed Steel Co., Box 556, Jenkintown, Pa. How to plan installation to fit over 1,000 storage needs.

65. Sandblast Machines

Leiman Brothers, Inc., 102 Christie St., Newark 5, N. J. Complete line of sandblast machines for cleaning, deburring, surface preparation, stencilling and matte finishing on metal, glass, plastics.

66. Chucking Machines

The James Coulter Machine Co., 641 Railroad Ave., Bridgeport, Conn. Threading and checking machines.

67. Cutting Tools

The O. K. Tool Co., Inc., Milford, N. H. Drawings show various types of boring heads, form cutters, milling cutters, end mills, reamers and trepanning tools.

68. Pressure Test Equipment

Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. Pressure test equipment for automotive, aircraft, appliance and farm equipment industries.

69. Resistance Welders

Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, Ohio. Complete line of resistance welding machines.

70. Hardness Testers

Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., 230-G Park Ave., New York 17, N. Y. Tukon testers for micro and macro hardness testing.

71. Milling Cutters

Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich. Milling cutters with throw-away type inserts.

72. Bearings

Johnson Bronze Co., 350 S. Mill St., New Castle, Pa. Industrial bearings, bushings and bars.

73. Turntables and Controls

Eisler Engineering Co., Inc., 734 S. 13th St., Newark 3, N. J. Indexing turntables, controls, gear and cam drives and special machines.

74. Assembly Machine

The Multra Corp., Stamford, Conn. Automatic assembly machine with interchangeable assembly tools.

75. Product Design

Pioneer Engineering & Manufacturing Co., Inc., 19669 John R St., Detroit 3, Mich. Profitable product design and development.

Square locked
head maintains
ACCURATE
alignment

Box section arm fully
encloses driving shaft

100%
Anti-friction
bearings

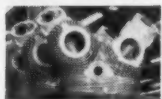
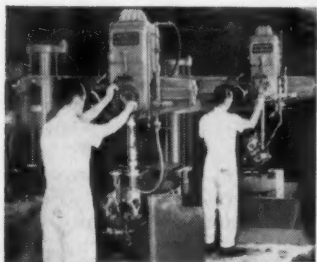
Head
in perfect
balance on
arm

Arm
swings with
finger tip
ease

No driving
clutches

LONG LIVED ACCURACY

in this high speed
Super Service
Radial!



Drilling, Core Drilling and Reaming Alloy Steel Chock and Counterweights of Aircraft Engine Crankshafts. Reamed holes are held accurate within .0008".

3 and 4 foot arm.

Spindle speeds up to 3500 r.p.m.
without belts.

This simplified, very versatile, speedy, accurate and durable machine is rigid and easy to handle.

A distinctive feature is the elimination of spindle driving clutches as forward and reverse rotation is thru a reversing motor . . . very fast for tapping work.

Furnished with 9" column with 3' or 4' arm and 3 HP driving motor.

Get the details. In their range, these machines are most economical and productive.

Write for Bulletin R-21C.

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BICKFORD**



RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

OAKLEY, CINCINNATI 9, OHIO, U.S.A.

For more data circle 318 on Reader Service Card

news of the industry

***New plants and expansions . . . company
name changes . . . new appointments***

RICHARD BROTHERS PUNCH DIVISION ACQUIRES NEW PLANT

The Richard Brothers Punch Division of Allied Products Corporation has announced the acquisition of a new plant at 25800 Groesbeck Highway, Roseville, Michigan.

This new manufacturing plant will provide additional production of R-B interchangeable punches, die buttons and other related products. The R-B manufacturing facilities have been moved into this new plant. The desire to improve service and provide faster deliveries of customer requirements prompted the R-B move into the new east side plant.

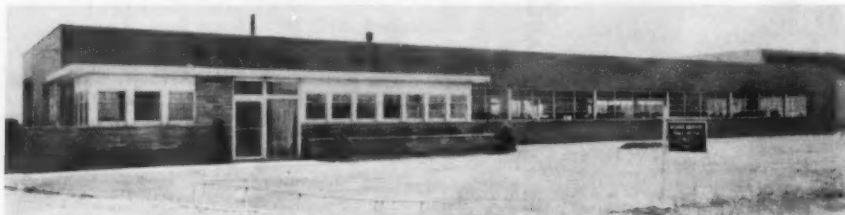
Richard Brothers Punch Division now has three modern manufacturing plants, each strategically located for

greater customer convenience: Hillsdale plant serves southern Michigan; Capitol Avenue plant serves west-side Detroit; Groesbeck Highway plant serves east-side Detroit. The general offices, order department, sales and engineering departments for all three plants of the company are located at 26500 Capitol Avenue, Detroit 39, Michigan.

★ ★ ★

SPEEDWAY MANUFACTURING COMPANY CONSTRUCTS NEW PLANT

Construction of a new plant, which will triple the production of its Speedway Manufacturing Company division, has been announced by Thor Power Tool Co., Aurora, Ill. The com-



View of New Plant of Richard Brothers Punch Division which is located at Roseville, Michigan.

pany has purchased a 15-acre industrial site at LaGrange Park, Ill., a western suburb of Chicago a few miles from the present SpeedWay plant. Erection of the new structure will begin soon and occupancy is slated for early 1957. The one-story building is to cover a large portion of the 15-acre site and will introduce several new features in modern manufacturing methods. Provisions are also being made for future additions to the structure. It will contain complete office quarters, and SpeedWay will move all manufacturing and administrative facilities to LaGrange Park when the new building is completed. Engineering and manufacturing of SpeedWay fractional horsepower electric motors will also be transferred there.

Since Thor acquired SpeedWay two years ago, many new portable electric "SpeedTools" have been designed and produced for the "do-it-yourself" market, as well as for the automotive repair, building, construction and industrial fields. Increasing demand for present tools in the line, plus projected de-

velopment of new products, prompted expansion of the production capacity of this Thor division.

★ ★ ★

BELLOWS WEST COAST ACTIVITIES IN NEW BUILDING

It was recently announced that all Bellows west coast activities are con-



HALLOWELL®

storage wall units make economical storage space

Use these sturdy units individually or stack them to form storage walls or partitions. Built of prime cold-rolled steel, all welded, finished in standard green baked-on enamel, units are 33 3/4 in. wide by 11 1/4 in. high, either 11 or 17 in. deep. Available with 12, 16, 18, 24 or 32 interchangeable drawers of 3 different sizes. Standard sizes are stocked by your industrial distributor. See him for details. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.

STANDARD PRESSED STEEL CO.

HALLOWELL

SHOP EQUIPMENT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

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news of the industry . . .



Wash drawing of new Bellows West Coast office which is located in Glendale, California.

solidated in a new building, erected by the company, at 926 Western Ave., Glendale, Calif. The new building will serve as headquarters for both The Bellows Company of California and the

Smith Johnson Manufacturing division of The Bellows Company.

The Bellows Company, with headquarters in Akron, Ohio, manufactures air cylinders and other work devices.



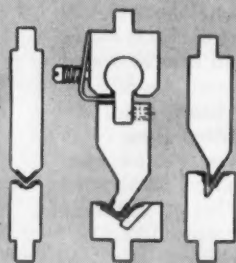
INDUCTION HARDENED PRESS BRAKE DIES

**for greater die life at no extra cost
on any make of press brake**

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO dies for your next press brake job.

4915

Steel Bending Brakes for over 50 Years



Heavy lines
indicate
hardened surfaces

DREIS & KRUMP

MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois



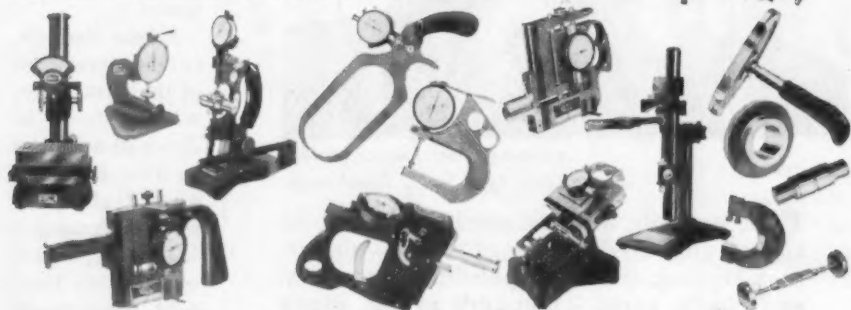
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IT'S a great advantage to work with a firm that presents a complete line... to deal with gage makers who understand your problems... to get the one gage *just right* for your job. Whether you work from our catalog or consult with us, you are assured the finest available instruments for your particular needs.

GAGES are our only product. To you, that means the benefit of over 30 years concentrated knowledge and experience. It also means wide selection, progressive design and time-and-money-saving innovations. For instance: Dializer® for converting ordinary snap gages to dial snap gages; DuBo® plug gage which tells more, more easily; Versa Dial® basic dial unit for a host of applications. These are some of the reasons *it pays* to *standardize* on STANDARD. Your inquiries are invited.

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STANDARD GAGE COMPANY, INC.
MEASURING INSTRUMENTS FOR PRECISION INDUSTRY
114 PARKER AVE. **POUGHKEEPSIE, N. Y.**



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news of the industry . . .

PRATT & WHITNEY COMPANY ACQUIRES JAQUITH CARBIDE DIE CORPORATION

The assets and business of the Jaquith Carbide Die Corp., Lynn, Mass., have been purchased by Pratt & Whit-

ney Company, Inc. Terms of the transaction have not as yet been disclosed.

Pratt & Whitney stated that Jaquith will be operated as the Jaquith Carbide Division of the company. This is the second such acquisition that Pratt & Whitney has made in the past several months. It recently purchased the Sterling Die Company of Cleveland, Ohio. It was indicated that the company would undertake an immediate

expansion program to enlarge Jaquith plant facilities and production program. The division will remain in Lynn. However, in order to meet demands for the various types of carbide dies it produces, increased manufacturing space has been acquired in Lynn, to which Jaquith will move in the next several weeks.

Edwin Jaquith, former president of the company, will continue to direct its activities as vice president and divisional general manager. He will report directly to Mr. Banfield, who heads all Pratt & Whitney cutting tool and gage activity. Francis Almaida has been appointed factory manager.



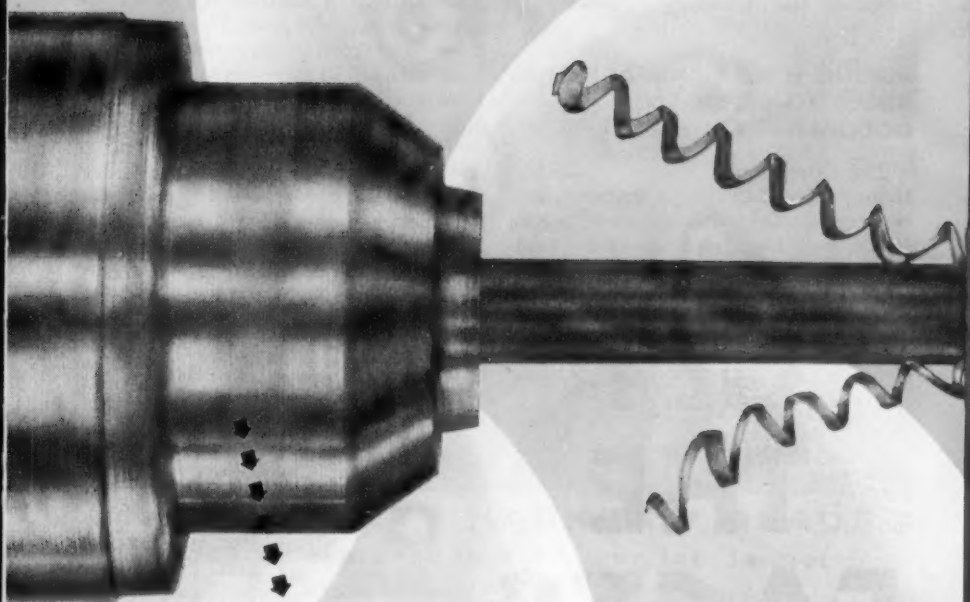
Polishing shaft bearing surface
with Schauer Type NA2C Speed Lathe.

These versatile, low-cost machines handle an almost unlimited variety of work — deburring, lapping, trimming, polishing—on metal and plastic parts. Thousands in use. Many sizes and models with holding devices to suit the job. *Speed production* with Schauer Speed Lathes. Write for Catalog No. 530.

SCHAUER MANUFACTURING CORP.

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Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

THE JACOBS MANUFACTURING COMPANY • WEST HARTFORD, CONN.



The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.



The Jacobs Rubber-Flex® Tap Chuck for tapping heads and impact tools.



The Jacobs Plain Bearing Chuck for drill presses, portable electric and air tools.



The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.



The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.



The Jacobs Impact Keyless Chuck especially designed for the aircraft industry.

news of the industry . . .

BORING HEAD MANUFACTURING ADDED TO GODDARD & GODDARD FACILITIES

The formation of a new subsidiary, Briney Manufacturing Company, specializing in the manufacture of boring heads, has been announced by Goddard & Goddard Co., Detroit, Mich.

Operated as a partnership under the Briney name for over five years, the new corporation represents another step forward in the company's plan for continued growth. The Briney line of "Size-Positive" boring heads will be a natural supplement to the extensive line of Go & Go milling cutters and other tools.

Officers of the new corporation are E. A. Goddard, president; O. R. Briney, Jr., vice president; J. W. Briney,

vice president; and H. C. Henderson, secretary-treasurer. Manufacturing activities of the company will be continued at the present location, 1165 Seba Rd., Pontiac, Michigan.

★ ★ ★

CHANGES AT HILL ACME

At a recent meeting of the board of directors of The Hill Acme Co., Cleveland, Ohio, the following officers were



J. B. Perkins,
president, The Hill
Acme Company

GET THE FACTS

About Hardness Testing

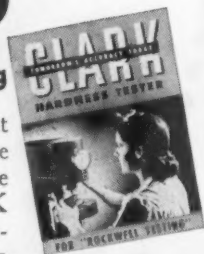
Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in English) and numerous illustrations show the equipment and procedure for fast, accurate hardness testing of ferrous and non-ferrous materials. If you would like a copy, *free of charge*, just attach this ad to your letterhead or write "Send book." A copy will be mailed to you promptly.

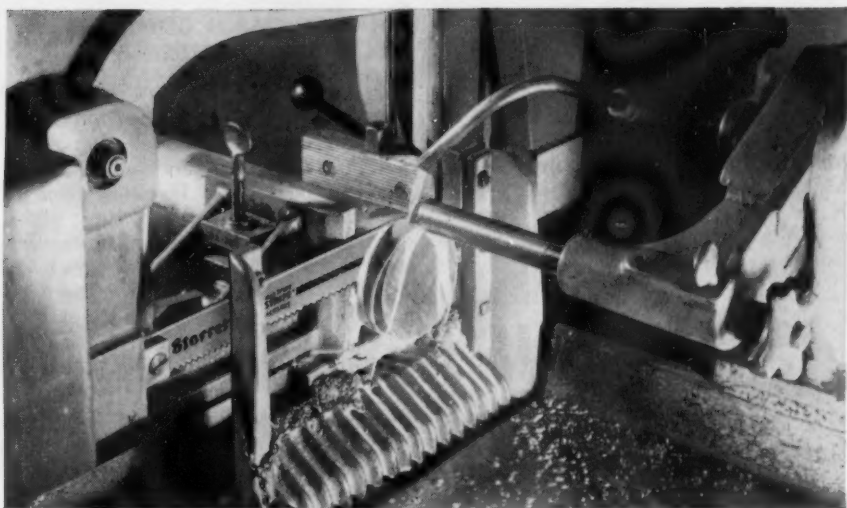
P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of *guaranteed accuracy*, say the word and we'll gladly supply them.

CLARK
CLARK INSTRUMENT INC.

10204 Ford Road • Dearborn, Mich., U.S.A.

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NEW STARRETT HACKSAW BLADES

production-proved to cut faster, last longer

From the Metallurgical and Production Testing Laboratory of the "World's Greatest Toolmakers" come three new hacksaw blades . . . each with special characteristics for faster, easier cutting and longer blade life on a wide range of cutting assignments. To make it easy for you to select the right blade for any job, they are distinctively color-identified and have easy-to-remember names.

Starrett REDSTRIPE® SM Power and Hand Blades, the yellow blades with the distinctive red stripe, are specially tempered for cutting hard materials with heavier feeds, higher speeds.

Starrett GREENSTRIPE SAFE-FLEX® Welded Edge Power Blades are double welded, shatter-proof, safer, straighter-cutting, longer-lasting. Especially recommended for tough alloy steels,

multiple cutting and interrupted cuts. Easily identified as the yellow blades with the green stripe. Hand blades also available.

Starrett BLUESTRIPE® High Speed Power and Hand Blades are specially heat treated for high speed production sawing of hard-to-cut metals . . . also recommended for general purpose cutting. Ask for the yellow blade with the distinctive blue stripe.

Starrett also makes a complete line of hole saws, band saws, and band knives — all available through your industrial distributor, a convenient and reliable source of supply. Ask him for the new Starrett Saw Catalog or write Dept. MD, The L. S. Starrett Company, Athol, Mass., U. S. A.

Starrett®

SINCE 1880
WORLD'S GREATEST TOOLMAKERS



MECHANICAL HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS • HOLE SAWS • BAND SAWS • BAND KNIVES



Use Starrett Production-Proved Band Saws for cutting metal, wood, plastics, etc.



Use Starrett Fast-Kut Band Knives for cutting soft or fibrous materials. 3 types, all sizes.



Use Starrett Safe-Flex High Speed Hole Saws for cutting clean, round holes in any material.

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news of the industry . . .

elected: J. B. Perkins, president; L. L. Hercik, vice president and general manager; H. W. Sullivan, vice president; J. R. Short, secretary; A. C. McDaniel, Jr., assistant secretary; and K. F. Bruch, Jr., treasurer. Former president, A. C. McDaniel, Sr., is active chairman of the board.

**WHITNEY CHAIN COMPANY
ELECTS NEW PRESIDENT**

Lewis H. Whitney was recently elected president of Whitney Chain Company at the annual meeting of the company's stockholders and board of directors held at the Hartford office of the company. At the same time, other elections to top management posts were announced. These include Einar A.

Hanson as vice chairman of the board; Brenness G. Tyrrell as executive vice president and treasurer; and Leota G. MacKenzie as assistant secretary. Park O. Boyd was re-elected secretary of the company.

W. H. Whitney, chairman of the board, presented to the approximately 70 stockholders present at the meeting, a graphic picture of the company op-



Lewis H. Whitney,
president, Whitney
Chain Company

**GREEN full floating
REAMER
HOLDER**
maintains
absolute
concentricity
in reaming operations!



- Corrects for misalignment • Prolongs tool-life

The Green Reamer Holder will automatically compensate for any misalignment of the reamer and the drilled hole. The unique design allows the reamer to float in any direction. No need for periodic checking; as once the float adjustment is set it will not change.

Shock on the cutting edges and any tendency to chatter is fully absorbed. No loss of grinding centers as the hollow shank permits whole reamer to be set in as far as necessary.

Available with standard or tapered shank.

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122 S. PRAIRIE AVE. • ROCKTON, ILLINOIS

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In every drilling operation there's a particular drill that will do the job for you quickly, accurately and economically.

Union offers a complete selection of top quality drills, standard and special, to suit the requirements of your job.

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

*Owners and Operators of: S. W. CARD DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec*

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news of the industry . . .

erations for the years 1952 through 1955, with projections for 1956.

★ ★ ★

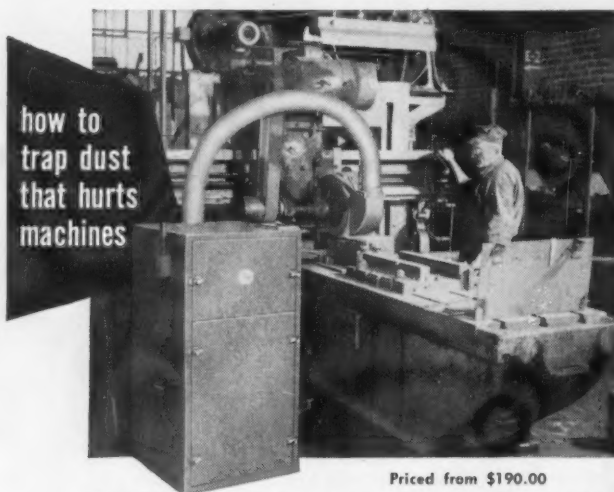
MICHIGAN TOOL FORMS NEW AUTOMATION DIVISION

Michigan Tool Company has announced the formation of its new Gear-

O-Mation Division at 17140 East Ten Mile Road, East Detroit, to design and build automation equipment for high-volume manufacture of gears and other small parts of similar size and contour. The new division will be a single, central source for the manufacture of complete automated gear production systems. Automation systems for production of small parts of similar size and contour to gears also will be manufactured. Conveyors, transfer

machines, storage and distribution systems and control systems, necessary for automated gear production will be produced at the East Detroit plant. Gear production machine tools, manufactured by Michigan Tool and others in the field, will be integrated into the systems. Some of these lines reach lengths of 1,200 feet.

Fred T. Proper has been named sales manager for the new division. He was formerly sales manager of the Manistee Iron Works Division. F. Zawaski and Joseph Zeld have been appointed supervisor of all engineering and supervisor of all manufacturing and erections, respectively.



Priced from \$190.00

Moveable TORIT units let you trap dust at its source

Untrapped dust costs you money: "secretly" forces your precision machines out of alignment, slows production, hurts morale. Torit dust collectors solve the problem—fit in almost anywhere. Usually more efficient and money-saving than central (built-into-the-building) systems.

You can move and install Torit units yourself. We'll check the installation—or handle the entire problem if you prefer. Torit units operate only when machines they protect are in use. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .



TORIT MANUFACTURING CO.

Dept. 703, 296 Walnut Street, St. Paul 2, Minn.

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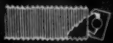


VLIER SWIVEL-PAD CLAMPS

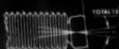
Now Available in 2 Types!

Both types have these outstanding features!

- Screw torque absorbed by pad, not the work piece.



- Unique ball-joint construction provides extremely smooth angle adjustment and rotation of pad.



- Pad swivels $7\frac{1}{2}^{\circ}$ each side of center line in all directions.



- Large flat pad area assures tighter clamping.



- Conical seat distributes clamping pressure uniformly.
- Eliminates costly, custom-made swivel pads.
- Du-Lite finish for rust proofing.
- Made from heat-treated, alloy steel to last for years.



The new Knurled Head Swivel-Pad Clamp

Use when finger-type clamping is sufficient. Wide knurled-head gives good gripping; assures fast screw run-in. Available in 4 different screw diameters; $1\frac{1}{4}^{\circ}$ and 2° screw lengths.



— Pat. Pend.

The Socket Set Swivel-Pad Clamp

Use wherever maximum rigidity is necessary, or where space is limited. Available in 7 screw diameters; various lengths.

Other Vlier products



Spring Plungers



Spring Stops



Toggle Pads



Fixture Keys



Torque Thumb Screws



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Write for
free 1956
Vlier catalog.

Distributors located in major U.S. and Canadian industrial areas.

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news of the industry . . .

CARLTON CELEBRATES 40TH ANNIVERSARY

May 6, 1956 marked the 40th anniversary of the founding of the Carlton Machine Tool Company, Cincinnati, Ohio. It was on that date in 1916 that

the William E. Gang Company was purchased by Carlton interests to form the present company.

The Carlton Machine Tool Company is the only known exclusive manufacturer of radial drills in the United States, devoting all its energies to the construction and development of this one machine tool. Among many distinctive accomplishments, it is said that the company was the first radial drill manufacturer

to introduce anti-friction bearings in its machining equipment.

Jack Carlton was the founder and president of the company until his death in February, 1948. Present officers of the company are: William A. Dermody, president and general manager; Frank Moran, vice president and treasurer, and James V. Carlton, company secretary.

In 1916, the company employ-

Look into the complete, cost-cutting LOVEJOY line.

Standard tools are in stock — to help you increase production, save time and money now!



INSERTED-TOOTH MILLING CUTTERS

Face, side, end, slotting and boring mills.

H. S. S., CARBIDE, ALLOY BLADES

Interchangeable in all Type "A" milling cutters from 4½" to 24" in diameter.

NEW! SET-SCREW TYPE END MILLS

And new Type "Z" slotting cutters provide maximum axial and radial adjustment.

Boring Tools • Arbors • Flywheels
Lovejoy Milling Cutter • Assembly Gage

Special cutters are a Lovejoy specialty

Write for new catalogs: No. 31 (Face Mills),
No. 32 (Side Mills), No. 33 (Arbors).

130 MAIN ST., SPRINGFIELD, VERMONT

Send for free
SPEED & FEED
CALCULATOR

LOVEJOY *Ltc*
TOOL COMPANY, INC.

SPRINGFIELD, VERMONT, U. S. A.

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William A. Dermody

Every day... *Everywhere*... Your Competitors are using

DEVLIEG
Spiramatic
JIGMILS®

for
**ULTRA-PRECISION
BORING and MILLING**



THE "ACCEPTED" MACHINE FOR JIGLESS PRODUCTION OR ONE-PIECE JOBS

The DeVlieg System of "JIGLESS BORING"—★ Eliminates expensive jigs ★ Permits complete flexibility of product design ★ Insures interchangeable assembly of parts without hand fitting.

DeVlieg JIGMILS are widely used in toolrooms and experimental shops for machining all types of jigs, fixtures and experimental parts to precise limits of accuracy with a minimum of operator skill.

Come to Detroit

SEE A PRACTICAL
DEMONSTRATION OF THE
JIGMIL TECHNIQUE

DEVLIEG MACHINE COMPANY

Write for Illustrated Catalog

450 Fair Avenue • Ferndale
DETROIT 20, MICHIGAN

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ed eight men. Today, the total employment of the company is approximately 225 people. During the past war, there were as many as 670 people employed by the company in the manufacture of Carlton radial drilling machines.

CRUCIBLE FORMS NEW DIVISION

Crucible Steel Company of America, Pittsburgh, Pa., has formed a new division for the fabrication and sale of steel springs. Known as the Spring Division, the new organization combines all previously existing Crucible spring fabrication and sales activities including Spring Works, Pittsburgh, and the company's Railroad and Spring Sales Division.

At the same time, Thomas T. Crowley was named general manager of the new division. Mr. Crowley was formerly staff assistant to W. H. Wiewel, senior vice president at Crucible. In his new position, Mr. Crowley is responsible for all phases of the division's operation including production, sales, personnel and administration. Division headquarters will be at Spring Works, McCandless Ave., Pittsburgh. Sales offices will also be maintained at Crucible's offices in New York and Chicago. The division will operate as a separate unit within the company with Mr. Crowley reporting directly to Mr. Wiewel.

for **BRASS** and non-ferrous metal tooling—



Unretouched photo of brass parts, internal tooling with B & W Flat Step Drills by Schaefer Screw Products Co., Detroit. Here's what Vice President Andrew Miller says after 10 years use:

"We've used B & W flat step drills exclusively for 10 years for all our internal tooling for non-ferrous metals. We get clean, accurate finished cuts with them and they can be sharpened quickly in our own shop without changing their dimensions. The uniformity and long tool life of these special tools has proved far superior to any we've tried. We operate 15 automatic screw machines on this work."

Send your blueprints for quotations. Literature on request.

B & W PRECISION PRODUCTS CO.

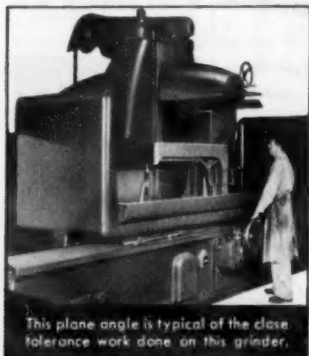
11393 E. Eight Mile Rd., P.O. Box 3865, Detroit 5, Mich.

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Courtesy—Machine Products Corporation

**Accurate, smooth operation speeds production
of difficult-to-grind precision parts**



This plane angle is typical of the close tolerance work done on this grinder.

This Meehanite iron plane angle is difficult to grind because it is high and narrow and hard to hold on the table. It must be ground to .0002 parallel in 60 in., removing .002 in. of stock on each pass.

Smooth operation of the "Mattison" eliminates vibration. Tolerances are easily maintained and setup time cut in half. Accuracy and production have increased 50 per cent. Mattison Surface Grinders give you smooth, accurate operation needed for this type of work, as well as a wide range of other grinding.

Mattison Machine Works, Rockford, Illinois, U. S. A.



**HIGH-POWERED
PRECISION
SURFACE
GRINDERS**

For more data circle 333 on Reader Service Card

news of the industry . . .

SELDEN T. WILLIAMS APPOINTED DIRECTOR OF SCOVILL MANUFACTURING COMPANY

Selden T. Williams, president of A. Schrader's Sons, Inc., has been appointed a director of Scovill Manufac-

turing Co., Inc. He is also president and treasurer of Schrader-Scovill Company Proprietary Limited of Australia. Mr. Williams joined A. Schrader's Son in 1929 and was later appointed vice president of Scovill Manufacturing Company, in charge of manufacturing of Schrader domestic and foreign plants.

Mr. Williams was graduated from St. Lawrence

University. He received his B.S. degree in 1913 and earned his Master's Degree there in 1926. He received his B.S. Degree in mechanical engineering at Worcester Polytechnic Institute in 1916.

After graduation from Worcester Polytechnic Institute, Mr. Williams became technical editor of The Class Journal in 1916, joined the Naval Aircraft Factory, Philadelphia in 1917, as assistant ex-

NELCO CARBIDE TIPPED MILLING CUTTERS . . .

CUT YOUR OVERHEAD!

You **DON'T** grind steel with a diamond wheel—when you use **NELCO** Cutters!

All carbide cutting surfaces overhang steel body!

NELCO sandwich braze guarantees a rugged, one piece cutter that works to close tolerances, can't chatter, teeth don't work loose!

NELCO pioneered slash milled design—gives more chip clearance—means less grinding

Gang cutting made simple—slot, maintain width with multiple cutters and shims!



Those who buy tools for lasting performance as well as initial appearance always specify "Nelco". These carbide tipped Milling Cutters are precision built for rugged dependability, engineered to "take it"—singly or in gangs—to save *real money*, deliver fast and accurate results without the operational and maintenance "headaches" of most conventional cutters. Look for benefits and appearance—call for Nelco—your distributor has the size and type you need in stock.

**SEND TODAY for
complete catalog**



NELCO TOOLS

*For that **EXTRA** Edge
in Production!*

NELCO TOOL CO., Inc. • Manchester, Conn.

For more data circle 334 on Reader Service Card



Selden T. Williams

Greater Magnetic Attraction . . .
More Efficient Design

Delpark

*Gravity Type
High Capacity
Low Velocity Flow*

Magnetic Separator

A new, more efficient design with gravity flow over an enormous, fully concentrated flat magnetic field to give the greatest, most efficient separation of ferrous sludge and abrasives from liquid.

- Greatest concentration of Alnico #5 Permanent Magnets.
 - Most powerful magnetic field.
 - Magnetic field doubled in width.
 - Liquids flow on top of magnetic field — gravity assists magnets.
 - Low velocity flow eliminates "washing" and turbidity.
 - Depth of liquid held within magnetic field.
 - Constant sludge removal by chain driven flights.
 - Self Cleaning — Fully Automatic.
- Delpark Magnetic Separators are available with adjustable legs, with dragout in tank, with collector tank or without tank. They are also used in combination with the famous Delpark Disposable media filter.



**Delpark . . . first in
filtration advancements**

Write for more
complete information

INDUSTRIAL FILTRATION COMPANY

12 Industrial Avenue
LEANOR, INDIANA

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news of the industry . . .

perimental engineer and later was assistant chief engineer. In 1922 he went with the Victor Talking Machine Company, Camden, New Jersey, where he worked up from assistant chief draftsman to general superintendent and works manager in 1927. He left the Vic-

tor Talking Machine Company in 1929 to join the Schrader Company.

★ ★ ★

CHICAGO PNEUMATIC TOOL ACQUIRES ALLEN MANUFACTURING COMPANY

Chicago Pneumatic Tool Co., New York, N. Y., has announced that it has

contracted to acquire the business of The Allen Manufacturing Co., Hartford, Conn., manufacturers of the Allen hex socket set screws, cap screws and a variety of other related products.

Manufacturing and sales operations will not be affected by the sale, and will be carried on without change by a new wholly owned subsidiary of the Chicago Pneumatic Tool Company called The Allen Manufacturing Company (a Delaware Corporation). According to officials of the Chicago Pneumatic Tool Company, present personnel and company policies will not be changed in any way whatsoever as a result of the new acquisition.

over **8,000** Different Selections
For Immediate Delivery!



Quality-Famous, Heavy Duty
AIR AND HYDRAULIC

CYLINDERS

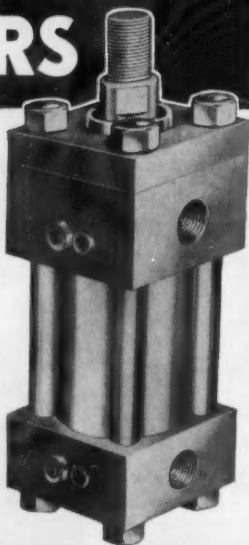
now "In stock" for
immediate shipment to you
in popular sizes, mountings

Eliminate costly production delays—speed-up your design and replacement programs—with this greatest quality selection ever offered on such fast delivery service.

AIR CYLINDERS, 200 psi, 1½" through 8" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

HYDRAULIC CYLINDERS, 2000 psi, 1½" through 5" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

Larger bores (up through 20" air, 12" hydraulic) and longer strokes (up to 22 feet) available on longer delivery.



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Data and Prices



MILLER FLUID POWER DIVISION

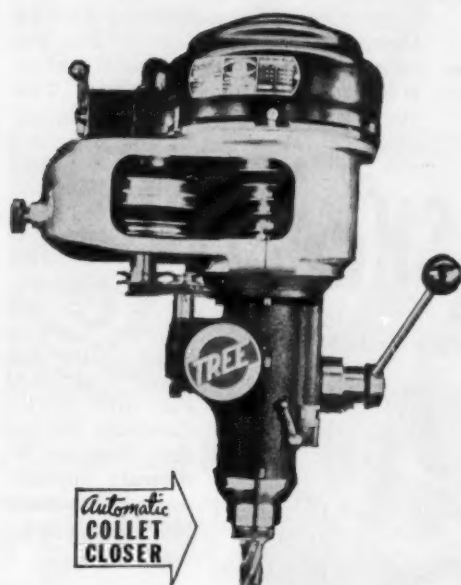
FLICK-BEEDY CORP.

2024 N. HAWTHORNE AVE., MELROSE PARK, ILL.

CYLINDERS • BOOSTERS • ACCUMULATORS
Sales and Service—From Coast To Coast

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do you need . . . VERTICAL MILLING CAPACITY?



You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground. Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

Cincinnati



Nichols



Kempsmith



Milwaukee



Bridgeport



EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address: "STRADESO"

TREE TOOL AND DIE WORKS

1600 JUNCTION AVENUE
RACINE, WISCONSIN

For more data circle 337 on Reader Service Card

industry news in brief . . .

Thor Power Tool Company, Aurora, Illinois, has moved to enlarged quarters at 2704 West Eighth Avenue, Denver, Colorado.

A. C. Wickman, Ltd. appointed sales representative in Canada, Metal Carbides Corporation, Youngstown, Ohio.

Philip R. Smith appointed assistant manager, Sheffield Michigan Sales Corporation — branch sales office of The Sheffield Corporation, Detroit, Michigan.

Dreis and Krump Manufacturing Company, Chicago, Illinois, has announced a new display and demonstration room at their plant. This room will be used for demonstrating to dealers and customers the various press and bending brakes.

Edward R. Gabriel named general manager, Greaves Machine Tool Company, Division of J. A. Fay and Egan Company, Cincinnati, Ohio. Joe W. Stewart appointed general sales manager and controller.

E. Louis Kaperaros named carbide cutting tool sales representative in Newark, New Jersey area, Carboly Department, General Electric Company, Detroit, Michigan. The Pacific district offices are now conveniently located at 2106 West Washington Boulevard, Los Angeles, California.

LAMINUM[®] SHIMS

SIMPLY PEEL FOR ADJUSTMENT



LAMINUM[®] Shims look and act like solid metal, but they p-e-e-l off in .002" (or .003") layers. LAMINUM[®] comes in BRASS, STEEL and ALUMINUM. Flash! Now also in Stainless Steel.

Laminated shims provide great accuracy with easy, economical machining tolerances. This simple method of spacing adjustment reduces lathe time, eliminates stand-

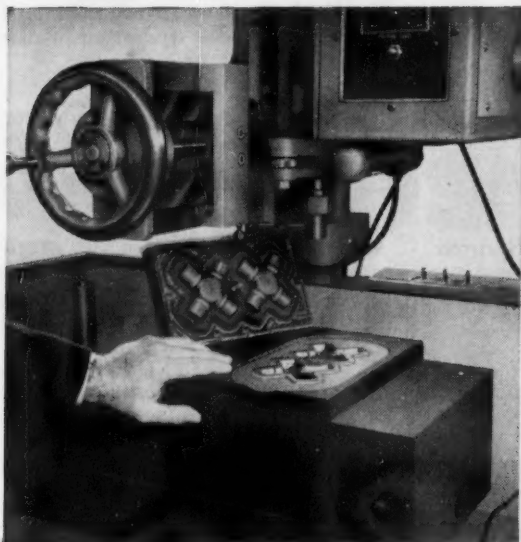
by machines. Adjustments in thousandths are made right at the job with a penknife. You eliminate the counting, stacking and mixing of ordinary shim procedure.

SEND TODAY for our Engineering Data File



3306 UNION STREET, GLENBROOK, CONN.

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Electrical Discharge Machining

saved \$448
sinking this
forging die
using BRASS electrodes

Conventional Method

Mill Cavity (Man and Machine)	56 hours
Hand Finish (Experienced die sinker)	52 hours
TOTAL	108 hours

ELOX method

Forge Electrode (Man and machine)	2 hours
Set up and change electrodes (man and machine)	8 hours
Machine hours only (no operator required)	32 hours
Hand finish after E.D.M.	2 hours
TOTAL	44 hours

Saved: 64 hours at \$7 per hour

elox

corporation of michigan

1839 Stevenson Hwy.
Royal Oak 3, Mich.

Elox Electron Drills for removing
broken taps, drills, etc., from \$495
to \$3450.

additional EDM advantages in forge die machining:

- Dies are fully heat treated prior to machining thus eliminating possible distortion.
- Resizing forging dies after washout can be done within two hours.
- Inherent workhardening values are retained in the dies since no additional re-heat treating is necessary.
- Actual die life is increased.
- Many forge die alloys are self-polishing after EDM.

This machining application is one of many time and material saving jobs being turned out by the standard Elox M-500 Electronic Machine Tool. See EDM in operation at Elox Demonstration Centers.

©T.M. Reg.

For more data circle 339 on Reader Service Card

industry news in brief . . .

The Chicago office of **Farrel-Birmingham Company, Inc.**, Ansonia, Connecticut, has moved to 10725 South Western Avenue.

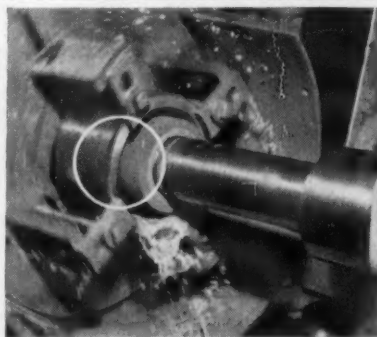
K. C. Mosier appointed Dayton, Ohio district manager, **C. A. Norgren Company**, Englewood, Colorado.

Henry M. Wood elected to the board of directors, **Ross Operating Valve Company**, Detroit, Michigan.

The new eastern regional branch of **Denison Engineering Company** is located at 315 Central Avenue, Clark, New Jersey.

W. H. Blackburn elected vice president, **The Billings and Spencer Company**, Hartford, Connecticut, and vice president of **The Peck, Stow and Wilcox Company**, of Southington, Connecticut.

Inside facts on the "TOUCH of GOLD" in internal grinding



Norton wheels for internal grinding are precision-processed for completely uniform structure and identical top performance — no adjustments to make when you change wheels. They're extra fast and cool cutting, extra long lasting — built in sizes and types, bonds and abrasives, to bring the profit-boosting "Touch of Gold" to every internal grinding job.

Ask Your Norton Distributor about the G Bond and 32 ALUNDUM* abrasive — the ideal combination for many internal grinding jobs. Or write to your nearest Norton district office — **NORTON COMPANY**, Worcester 6, Mass. Distributors in all industrial areas. Behr-Manning, Troy, N. Y., division of Norton Company. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1668



*Making better products...
to make your products better*

Norton Products: Abrasives • Grinding Wheels • Grinding Machines • Refractories
Behr-Manning Products: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

For more data circle 340 on Reader Service Card

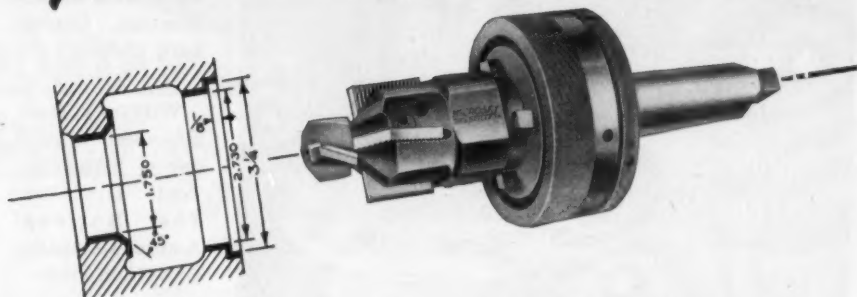
M. L. Backstrom appointed assistant district sales manager — Chicago district, **Firth Sterling, Inc.** Pittsburgh, Pennsylvania. **C. C. Krogh** appointed assistant manager, carbide sales division.

James L. Lewis appointed assistant to the president for administration and sales, **Van Norman Industries, Inc.**, Springfield, Massachusetts. **Paul C. Eberhardt** appointed assistant to the president for manufacturing and research.

Cut Costs WITH

McCROSKY

Special PRODUCTION TOOLS



do 3, 4, 5 or more operations at
the same time **1 tool—1 setup**

• Engineered specially to your work prints, McCrosky "Specials" combine related facing, boring, counter-boring and chamfering operations — perform them all simultaneously. This assures absolute concentricity and uniformity of finished pieces — eliminates stock-piling and re-handling between operations — speeds up production — reduces the amount of work in process — shortens deliveries — and produces other economies so great that they pay their way even on moderately short runs. Send your work prints to McCrosky, and write for a "Specials" bulletin. It gives complete details; illustrates nearly 50 typical examples.



McCROSKY

**TOOL
CORPORATION**
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

For more data circle 341 on Reader Service Card

industry news in brief . . .

J. Lee Hackett Company appointed exclusive distributor in eastern Michigan, **Covel Manufacturing Company**, Benton Harbor, Michigan.

F. Hallock Company appointed authorized distributor, **The Nelco Tool Company**, Manchester, Connecticut.

Gordon F. Colson appointed field engineer, **Norton Company**, Huntington Park, California.

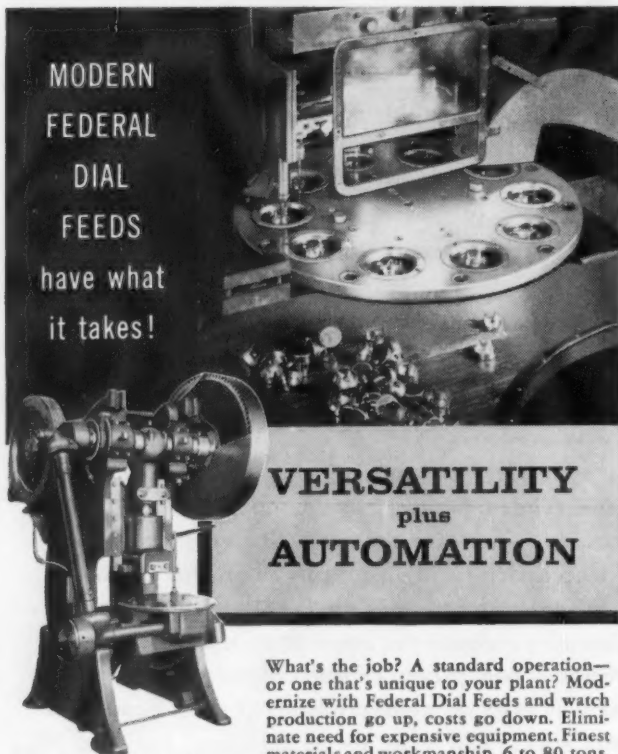
Austen B. McGregor appointed labor relations administrator, **Crucible Steel Company of America**, Pittsburgh, Pennsylvania.

Frank Brandt appointed exclusive representative in New England, **Precision Welder and Flexopress Corporation**, Cincinnati, Ohio.

William E. Bour appointed manager — Threading Tools Division, **The National Acme Company**, Cleveland, Ohio.

Cox Engineering and Sales Company appointed representative in the Detroit area, **Rivett, Inc.**, Boston, Massachusetts.

Melvin S. Glandon, **Philip J. Moore** and **Julian Slezak** appointed direct representatives for midwest territory and southwest territory, **Utica Drop Forge and Tool Corporation**, Utica, New York.



MODERN
FEDERAL
DIAL
FEEDS
have what
it takes!

VERSATILITY
plus
AUTOMATION

No. 7 Dial Feed
Capacity, 80 tons

Write for new Dial Feed Catalog

What's the job? A standard operation—or one that's unique to your plant? Modernize with Federal Dial Feeds and watch production go up, costs go down. Eliminate need for expensive equipment. Finest materials and workmanship. 6 to 80 tons. Automatic feeds and ejectors if desired.

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604 Division Street, Elkhart, Indiana

FEDERAL DIAL FEED PRESSES

31 Years' Experience in Dial Feed Engineering and Construction

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It isn't the same old grind...



It isn't the same old grind because smooth, powerful, Sioux Sanders and Sioux Abrasive Discs operate with cost cutting speed and ease. Sioux Sanders are precision engineered and quality built for fine performance. And there's a dependable Sioux Sander to meet each requirement. It's an investment you'll feel good about as it repays you with year after year of dependable service.

Sioux Resin Bond Abrasive Discs cut fast and last long. Tempered aluminum oxide grain assures maximum action. They are tough and flexible. Cutting action is not affected by grinding heat. Industrial, Regular, and Open coat types are available for each purpose.

and



No. 1250 9" High Speed Heavy Duty Sander



No. 1267 7" High Speed Heavy Duty Sander



No. 1256 7" Lightweight Electric Sander



USE SIOUX ALL THE WAY THROUGH

STANDARD THE WORLD OVER...

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

ELECTRIC IMPACT WRENCHES • GRINDERS • FLEXIBLE SHAFTS • POLISHERS • DRILLS
HAND SAWS • SANDERS • VALVE FACE GRINDING MACHINES • ABRASIVE DISCS

For more data circle 343 on Reader Service Card



June, 1956

modern machine shop 197

industry news in brief . . .

John E. Bashforth appointed national and foreign field manager, **Nichols-Morris Corporation**, White Plains, New York.

George C. Howe elected to board of directors, **The Felters Company**, Boston, Massachusetts.

Martin Victor elected secretary, **The Babcock and Wilcox Company**, New York, New York.

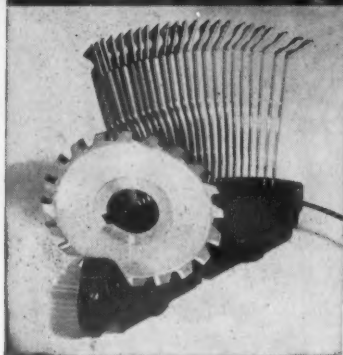
Woodrow W. Hamilton appointed sales manager — **Micronics division**, **Elgin National Watch Company**, Elgin, Illinois.

A. Cary Hawthorne, Jr., named Maryland district sales manager, **Rockwell Manufacturing Company**, Pittsburgh, Pennsylvania. **Frank T. Gearhart** named Philadelphia - South New Jersey district sales manager. **James A. Webster, Jr.** appointed western New York district sales manager. **Charles S. Zollinger** appointed Pittsburgh district sales manager.

Neff Kohlbush and Bissell appointed exclusive distributors, **Ekstrom, Carlson and Company**, Rockford, Illinois.

Robert N. Hamilton and Robert P. Cooper named abrasive engineers, **The Norton Company** in Los Angeles, California.

**If You Can See It—You Can
SAW IT with a GAY-LEE**



**Slotting typewriter type
bar segment.**

"THINSAW"

Solve problems in high-precision slitting, slotting, sawing with Gay-Lee carbide-tipped Thinsaw! Wafer-thin for the most delicate work with positive alignment and rigidity that avoid run-out . . . but retaining the speed and long life of carbide. Patented construction holds tips firmly.



- **THIN AS .030"**
- **DIAMETERS UP TO 12"**

**Complete Line of Saws for Any
Application—To Any Tolerance**

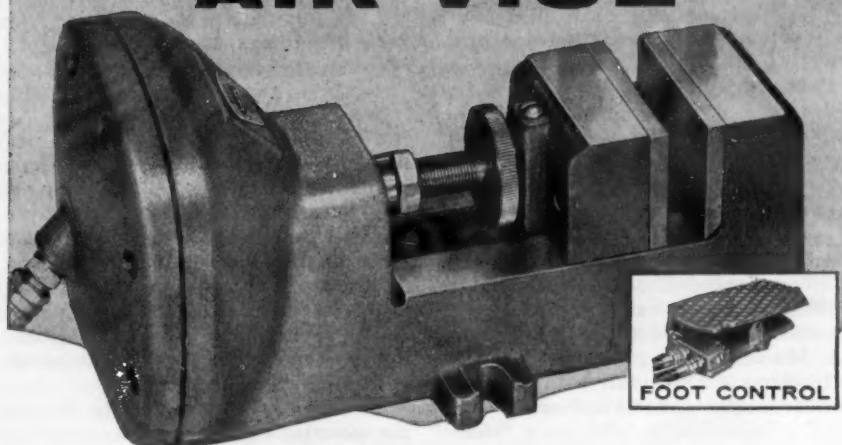
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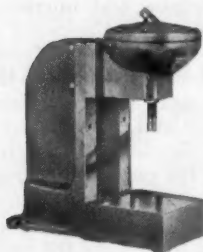
Speedy

AIR VISE



HIGH SPEED • POWERFUL GRIP

New, improved model speeds up all repeat operations—*milling, drilling, tapping, punching, bending, riveting*. Both hands left free to produce more! Light squeeze to 2250 pounds pressure! Extra thick jaws for attaching jigs. Jaws open to 3 inches; $\frac{1}{16}$ " to $\frac{3}{8}$ " maximum travel. With foot control and air hose. **\$44.00**

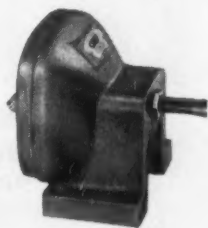


SPEEDY 1-TON AIR PRESS

Does the work of expensive presses! 5-inch throat; Ram 0 to 5"; stroke $\frac{3}{8}$ "; table 5" x 5". Operated by foot or our fingertip controls. \$85.00

SPEEDY AIR RAM No. 70

Mounts in any position. Compact, extremely sturdy. Exerts gentle pressure to one ton thrust. $6\frac{1}{2}$ " high, $5\frac{3}{4}$ " wide. \$35.00



Order from Your Supplier or Write for Air Tool Catalog

W. R. BROWN CORP., 2649 N. NORMANDY AVE., CHICAGO 35, ILL.

AIR REGULATORS • AIR VALVES • AIR FILTERS • PAINT SPRAYERS • AIR COMPRESSORS

For more data circle 345 on Reader Service Card

new shop equipment

**Descriptions of new machines, tools
and materials for metalworking.**

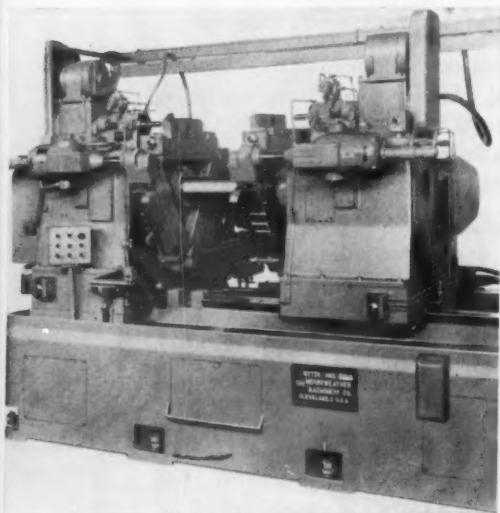
MACHINE SIMULTANEOUSLY MILLS AND CENTER DRILLS WORKPIECES

Identified as the Model MCT-3, a universal production type automatic milling and centering machine, announced by The Motch & Merryweather Machinery Co., 888 E. 70th St., Cleveland 3, Ohio, can be quickly set up for lengths up to 48 inches and drills

to a depth of 4 inches if desired. Two triangular fixtures with six trunnion vises index 120 degrees between three stations. Station one is for loading and unloading. At a second station milling is performed, while at a third station double-end center drilling takes place. These three operations (load-unload, mill, and center drill) are simultaneous and in the foregoing order.

The three-station indexing figures are mounted on anti-friction, cartridge type bearings keyed to a large steel shaft with automatic indexing by hydraulic power. Large shot bolts provide accurate positioning and rigidity. Hydraulic-electric torque wrenches are mounted on either side of the trunnion, arranged for quill movement to engage the screw-actuated, self-centering vises for clamping and unclamping. When the trunnion has indexed to station No. 1 the wrenches advance, engage the vise screws, and open the vises. When the next part has been properly positioned and the start cycle button depressed, the torque wrenches reverse, clamping the part to the proper tension and then retract, permitting the trunnion to index. Circuit interlocks are provided to prevent the trunnion from indexing until machining elements and torque wrenches are in their respective return positions.

The machine is arranged for complete automatic cycle with parts being



**View of Motch & Merryweather Model MCT-3
Automatic Milling and Centering Machine**

manually loaded into the work-carrying fixture at the front of the machine, then progressively indexed to the milling and drilling stations, and back to the front of the machine for unloading. As an added accessory, automatic loading and unloading can be incorporated in order to automate fully the milling and centering operations.

The work-carrying vises and the housing supporting the machining units on the right hand side are adjustable for lengths to the full machine capacity. This housing is supported on broad ways with power adjustment by hydraulic cylinder. Manual clamps secure the housing to the ways to insure rigidity.

Milling heads are of single-speed type, and are adaptable for carbide tooling. Speed changes are available with change gears. The quill type spindle has a 2-inch manual adjustment by graduated dial with a positive manual lock. The feed rate of heads is infinitely variable. The drilling heads are of single speed, quill feed type, with infinitely variable feed rate. Spindles are direct driven by timing cog belts, but speed changes can be made by belt and pulley change.

For more data circle 76 on Reader Service Card

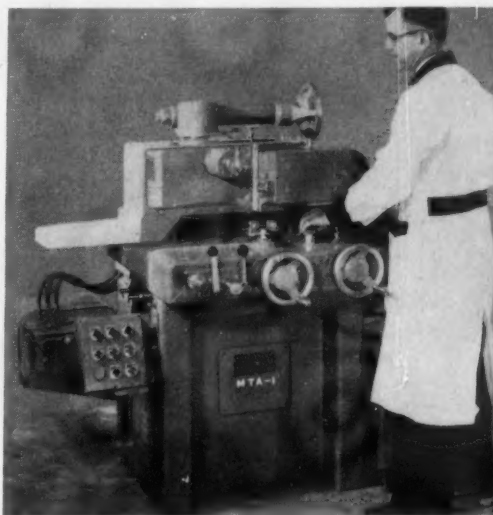
★ ★ ★

SLICING MACHINE FOR GERMANIUM AND OTHER BRITTLE MATERIALS

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has announced the Model MTA-1 "Microtomatic" Precision Slicing Machine designed to solve the problems confronting manufacturers of transistors and other devices employing brittle, crystalline semiconductors such as germanium and silicon. The machine is an automatic, hydraulically actuated, circular sawing machine employing a thin circular diamond saw blade for slicing ingots. A 6-

inch by 18-inch work table provides ample room for workholding fixtures. The table moves on hand-scraped ways feeding the germanium or silicon ingots into the cutting wheel at rates as low as one sixteenth inch per minute. Easily adjusted trip dogs control the length of cutting stroke and provide automatic quick return at speeds up to 50 f.p.m. When slicing, automatic cross indexing takes place on the return stroke. Cross indexing can be set at the hydraulic control panel to produce slices of any desired thickness accurate to plus or minus 0.0005 inch. Stops are provided so that cross indexing can be adjusted to the length of the ingot or ingots being sliced.

The slicing fixture designed for use on the Microtomatic makes it possible to use small, thin wheels, thereby reduces waste and increases the number of useable transistor blanks obtained from each crystal ingot. Setting up for precise automatic slicing on the Microtomatic is not difficult. Essentially, the



DoAll Model MTA-1 "Microtomatic" Precision Slicing Machine for brittle materials

THOUSANDS
of **SUPEREAM**
STUB and CHUCKING
REAMERS by the

THOUSANDTHS

**in our stock bins, ready
for immediate shipment**

**All flutes ground
after heat treat-
ment to eliminate
freezing of chips.**



*All Decimal Reamer diameters are held to plus .0002 and minus .000 for close sizing. Chucking reamers available in 4 sets.

**THE PRECISE SIZE FOR
THE JOB!**

No need to order specials and wait? **NOW** — right from stock ready for immediate delivery . . . Decimal Chucking or Stub Reamers, Fast-cutting, long-lasting 18-4-1 high speed steel. Made for your production economy . . . and **SMOOTH REAMING.**

We take pride in the fact that we perpetually maintain — **IN STOCK** — the largest decimal range of reamers available from any single source in the world!

Our engineering service is always at your disposal.



FREE!

Just off the press! Complete Reamer Catalog with the World's Greatest Reamer selection by the thousand's. Write for it.



**TWENTIETH CENTURY
MANUFACTURING CO.**

ROUTE 176 and BRADLEY ROAD
BOX 429M LIBERTYVILLE, ILL.

In Emergency . . .
Phone
Libertyville 2-4200

For more data circle 346 on Reader Service Card

202 modern machine shop

new shop equipment . . .

fixture is a motorized precision head-stock that can be mounted on the work table and accurately aligned parallel to the cutting spindle. Adjustable keys on the fixture base permit quick, accurate alignment of fixture to spindle. The faceplate to which the end of a germanium crystal can be cemented, is a compound assembly which can be adjusted to bring the crystallographic plane into coincidence with the plane of rotation. The crystal can then be rotated at an appropriate speed during the cutting stroke. Consequently, a saw only large enough to cut to the center of the workpiece will suffice. For crystals under 1½ inches in diameter, a 3-inch saw may be used.

Some large power transistors make use of a complete wafer as produced by the slicing operation but most transistor blanks are made by cutting the thin wafers into tiny squares. The wafers are held for dicing by cementing them to ceramic plates which are, in turn, held by a fixture on the work table of the Microtomatic. The fixture is a serrated chuck with back stop and clamps to hold up to five 4½-inch square plates. Each plate can be covered with germanium or silicon wafers so that a full work-load might be twenty or more wafers. The Microtomatic spindle for dicing is a special high-speed unit with a 3½ inch extension to permit mounting and spacing of a number of 3-inch diameter circular diamond saw blades.

The extremely slow and smooth feeding table, coupled with the vibrationless spindle, makes the Microtomatic capable of slicing a wide range of hard-to-machine materials. It can be used on piezoelectric crystals and for slicing test blanks from small, hardened steel or tungsten carbide tools.

For more data circle 77 on Reader Service Card

June, 1956

SHELDON

CHICAGO U. S. A.

BUILT • • • to Turn out PROFITS

Sheldon Lathes are designed and built to do accurate lathe work rapidly and profitably. Moderate in price they have the collet, swing and power capacity to do most toolroom work.

Design Features:

- Large and wide "Zero Precision" Tapered Roller Spindle Bearings—permit operation at all speeds, retain accuracy, end expensive bearing maintenance costs.
- 54-pitch Gear Box—gives both standard and many hard to get thread ratios.
- Large Micrometer Dials—Make accurate operation easier.
- Extra Collet Capacity— $1\frac{3}{4}$ " hole through spindles available on 10", 11" and 13" swing lathes.
- More Power to Spindle—Efficient drives with bigger motors and double neoprene V-belts to spindle.



UM56P
13" Swing Lathe
34" Between Centers
Rapid Shifting "U" Drive

UM56P
\$1615.00
Base Price
F.O.B. Chicago

OPTIONAL FEATURES AT EXTRA COST

include: Hardened ways, Long Tapered Key Drive Spindles, 4" D1 Camlock Spindles bed turrets, collet attachments, and other production and toolroom accessories. Lathes available with a choice of "Bench," "Cabinet" or "Pedestal" mountings.

Write for New Catalog G-55

SHELDON MACHINE CO., Inc.

4250 N. Knox Ave.

Chicago 41, Illinois

For more data circle 347 on Reader Service Card

June, 1956

modern machine shop 203



new shop equipment . . .

LIGHT-WEIGHT UNIVERSAL CHUCK FEATURES CONTROLLED CENTERING PRESSURE

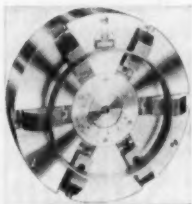
Horton Chuck, Windsor Locks, Conn., has recently introduced a light-weight 6-jaw universal chuck with controlled centering pressure. This chuck, with its adjustable centering feature,

operates rapidly and accurately to center the workpiece without danger of distortion due to overtightening by the operator. This is accomplished by setting the holding pressure desired on a calibrated plate in the center of the chuck. The six universal jaws are then brought into the piece simultaneously until contact is made and the pre-set pressure is reached. Upon arrival at this point, the jaws stop automatically, due to a slip-clutch arrangement, and

holds the piece at the required pressure until released. This action is said to eliminate the danger of distortion to small diameter thin-walled rings, weldments and other fragile parts subject to distortion by over-chucking.

The chuck is manufactured in diameters of 12, 15, 18, 21 and 24 inches, suitable for any type of spindle mounting, and is available in 3, 4, 6 and 8 jaw styles. Top jaws can be supplied in any style.

For more data circle 78 on Reader Service Card



Horton Six-Jaw Universal Chuck

MEASURING & CHECKING EQUIPMENT

Tailored to your job

HEIGHT BLOCKS
aluminum body,
hardened steel
top and bottom

ANGLE PLATES

ADJUSTABLE ANGLE PLATES
and
LAYOUT ANGLE PLATES

ANGLES
in 39 sizes

SURFACE PLATES
over 50 sizes

BOX
PARALLELS
in 18 sizes

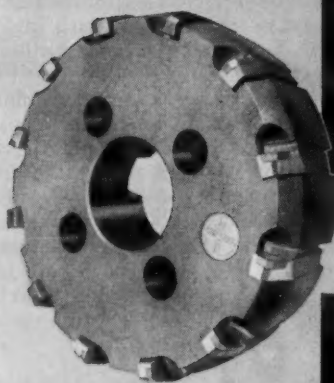
UNIVERSAL
ANGLES
in 10
sizes

Write for Catalog today

MACHINE PRODUCTS CORP.

6771 EAST McNICHOLS ROAD
DEPT. F, DETROIT 12, MICHIGAN

For more data circle 348 on Reader Service Card



Where heavy cuts are the rule, Kroslok performs long and profitably.

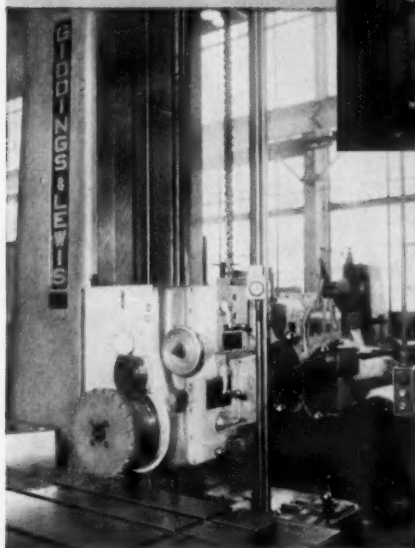
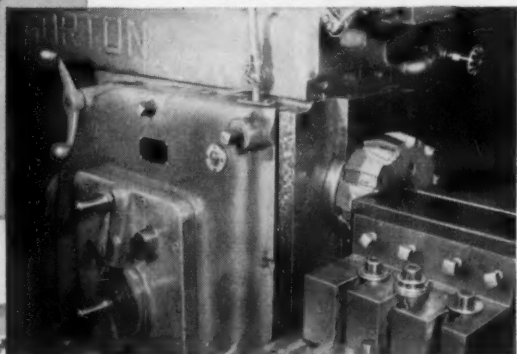
KROSLOK[®] MILLING CUTTERS

GROUP IMPORTANT CONCEPTS
FOR *Higher Production*

TOP FEEDS
AND SPEEDS

**RUGGED
RIGID**

ONLY 3
MEMBERS



Production milling requires "tops" in production tools.

Production milling realizes a new high with Kroslok face milling cutters and shell end mills. Simplicity of design (only three members), extreme ruggedness and rigidity, merit your thorough investigation. Kroslok is available in general purpose and heavy duty types for ferrous or non-ferrous metals, with both fine tooth and extra fine tooth variations, in diameters from 3" through 24". May we suit Kroslok's advantages to your job?

THE
**MOTCH & MERRYWEATHER
MACHINERY CO.**

CUTTING TOOL MANUFACTURING DIVISION
CLEVELAND 17, OHIO

Stocking Dealers in All Industrial Centers

TRIPLE-CHIP CIRCULAR SEGMENTAL AND SOLID CUT-OFF BLADES • TRIPLE-CHIP
SLYTING SAWS • TRIPLE C GRINDING COOLANT • TRIPLE-CHIP SOLUBLE OIL

For more data circle 349 on Reader Service Card

new shop equipment . . .

CUT-OFF MACHINE ELIMINATES MANY FINISHING OPERATIONS

A new model cut-off machine has been announced by Walker-Turner, Inc., Plainfield, N. J. This newest machine in Walker-Turner's "light-heavy-weight" line is available for use with a dry-cutting abrasive wheel for cutting

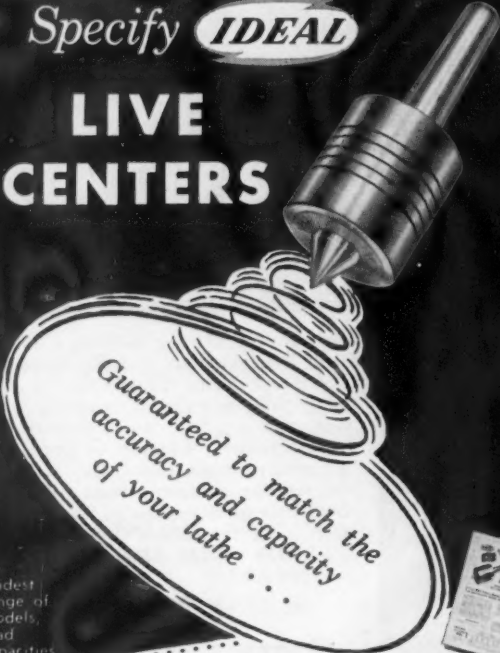
rod, bar and tubing stock, and the same machine may also be used with high-speed saw blades and with conventional wood-cutting blades.

The cut-off machine is available equipped with an air-feed attachment for repeated production operations. This is a 100 per cent pneumatic device, which requires no electrical connections and can be installed without machining. The air feed attachment can be used in connection with either automatic stock feed or hand feed.

An automatic spray coolant system, which supplies coolant to the blade while cutting, is also available. This system may be used on either hand or air operated machines. Economy of operation is a feature, because cool-

Specify **IDEAL**

LIVE CENTERS



Guaranteed to match the
accuracy and capacity
of your lathe . . .

Widest
range of
models,
load
capacities
and tapers
for every
job!

ORDER
FROM
YOUR
IDEAL
DISTRIBUTOR OR
MAIL
COUPON . . .

IDEAL IDEAL INDUSTRIES, Inc.
1031 Park Ave., Sycamore, Illinois

Kindly send us data on Ideal's complete line of
LIVE CENTERS.

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COMPANY _____

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CITY _____ ZONE _____ STATE _____

CANADIAN DISTRIBUTOR: Irving Smith, Ltd., Montreal

For more data circle 350 on Reader Service Card



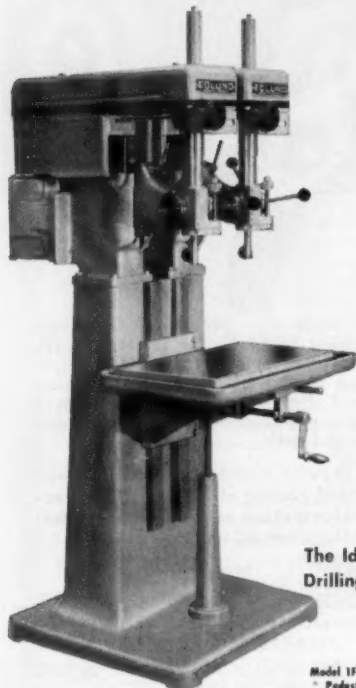
View of Walker-Turner Cut-Off Machine

EDLUND

Sensitive Drilling Machine

MODEL 1F

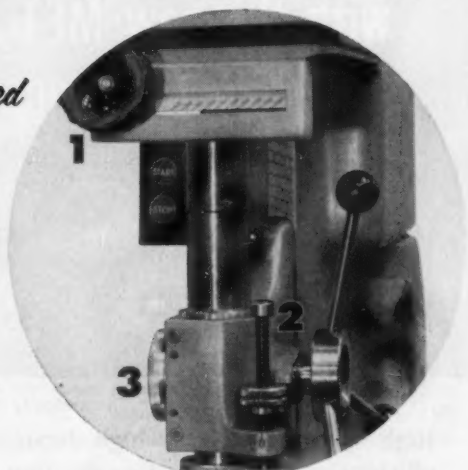
Infinitely Variable Speed
10,000 R.P.M.



SPECIFICATIONS

Overhang	7"
Capacity (Cast Iron).....	3/4"
#1 Morse Taper or Jacobs Chuck	8-1/2"
Speed Range — Optional	
825 to 5000 RPM	
1350 to 10000 RPM	
Spindles — 1 to 6	
Pedestal and Bench Types	

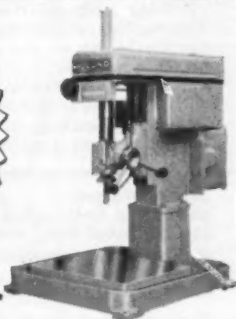
Model 1F—3 Spindle
Pedestal Type



- 1** **INFINITELY VARIABLE SPEED CONTROL**
Simply turn knob for any speed within range of the machine. Swift, powerful, and positive action.
- 2** **MICROMETER GRADUATED DEPTH GAUGE**
Permits accurate pre-set depth control for all precision production drilling. Clearly graduated to .001".
- 3** **ADJUSTABLE SPINDLE TENSION CONTROL**
Compensates for different drilling conditions. Three handle feed lever reduces worker fatigue.

The Ideal Drilling Machine for High Speed Sensitive Drilling of Small Parts, Light Assemblies, and Instrumentation.

*America's
Most
Popular
Drilling
Machine*



Model 1F—1 Spindle
Bench Type

EDLUND

MACHINERY COMPANY Cortland, New York

Division—Precision Castings Co., Inc., Subsidiary—Harsco Steel Corporation

EDLUND REPRESENTATIVES IN MAJOR CITIES

For more data circle 351 on Reader Service Card

June, 1956

modern machine shop 207

Low cost—high speed hard-facing with the new METCO THERMOSPRAY process



Hard-facing pump rod with
the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials

faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed Metco Process, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.



**Metallizing
Engineering Co., Inc.**

1177 Prospect Ave., Westbury, L. I., New York
Telephone: EDGEWOOD 4-1300

In Great Britain: Metallizing Equipment Co., Ltd.
Chobham near Woking, England

The following trade names are the property of
Metallizing Engineering Co., Inc.:
METCO®, ThermoSpray ® Reg. U. S. Pat. Off.

Don A. Watson
Metallizing Engineering Co., Inc.
1177 Prospect Ave., Westbury, L. I., N. Y.

Please send me more information

- ☐ about the New ThermoSpray Gun
☐ about ThermoSpray Hard-Facing
☐ Please arrange a demonstration in my shop.

name _____
company _____
street _____
city _____ zone _____ state _____

For more data circle 352 on Reader Service Card

NOW — Metallizing without compressed air

New Metco ThermoSpray Gun — Spray stainless steels, bronze — restore worn or damaged machine parts. Lowest installation cost ever—save up to 90% of replacement costs.

Now, with the development of the new METCO THERMOSPRAY GUN for spraying powdered metals, the cost of a metallizing installation is less than a third of the cost of a wire gun installation. Here's a great opportunity to get into profitable money-saving metallizing operations with a very modest outlay.

With the Type P THERMOSPRAY GUN, a tank of oxygen and one of gas, a few accessories, and you're in business. You can do a wide range of metallizing work—build-up with harder, longer-wearing, corrosion-resistant stainless steel or bronze. Build up worn pump plungers, motor shafts, and many other types of machine parts. Do your own hard-facing, too. (See opposite page.)

Free bulletin — send the coupon for a new bulletin describing the METCO Type P ThermoSpray Gun — or better still, ask for a demonstration in your own shop by a Metco field engineer. He'll be glad to show you how the new METCO ThermoSpray Gun works on some job of your own. No obligation, of course.



**Metallizing
Engineering Co., Inc.**

Westbury, Long Island, New York
Great Britain:
Chobham near Woking, England

new shop equipment . . .

ant is applied only during the actual cutting. A similar coolant system, using a re-circulating pump, is also available.

The heavy cast iron table comes drilled so that the head may be mounted at 45 degrees for mitering, and the table may also be drilled and tapped for any desired workholding devices.

The machine takes abrasive wheels and saw blades up to 12 inches in diameter. Blades or wheels are guarded by a heavy cast iron guard which, the manufacturer claims, provides 216 degree peripheral protection to the operator. A 3 h.p. 220/440 volt, 3 phase motor is supplied with the machine. It is totally enclosed, fan-cooled, ball bearing and has an overload capacity up to 7 h.p.

For more data circle 79 on Reader Service Card

★ ★ ★

SMALL LABORATORY FURNACES

The L & L Manufacturing Co., 136 Eighth St., Upland 71, Del. Co., Pa., has announced a line of "Dyna-Trol" furnaces designed for research laboratories, dental laboratories, small heat treating applications and so on. Heat-up time to 2,000 degrees F. is accomplished in one hour. 2,300 degrees F. is attained in one and one half hours. Temperature range is from 300 to 2,000 degrees F. in one series and 400 to 2,300 degrees F. in another. Some of these furnaces operate on 110 volts and plug in. The sizes are 4½ inch. de x 4½ inches high x 6 inches deep in the P46 and P46H models and 6 inches wide x 6 inches high x 6 inches deep in the P76 and P76H models. Other models are to 6 inches x 6 inches x 18 inches in interior dimensions.

Temperature may be held at any desired level within the temperature range of the furnace by means of in-

For more data circle 353 on Reader Service Card

June, 1956

modern machine shop 209

new shop equipment . . .

put controllers. These input controllers may be set at from 7 to 100 per cent of input. Zone gradient control is designed in by use of multiple circuits, each with its own input controller. Gradients are indicated by a pyrometer and two thermocouples located zone-



COLLIS COLLET EQUIPMENT

★ COLLIS Equipment fills today's important production needs so well because they are made by men skilled in making this type of equipment. Supply the proper unit from a complete range of types and sizes for Drill Sleeves and Sockets, Lathe Centers, Chuck Arbors, and Drill Drifts. We will handle your orders promptly.

THE COLLIS COMPANY
DEPT. A, CLINTON, IOWA

For more data circle 354 on Reader Service Card

210 modern machine shop

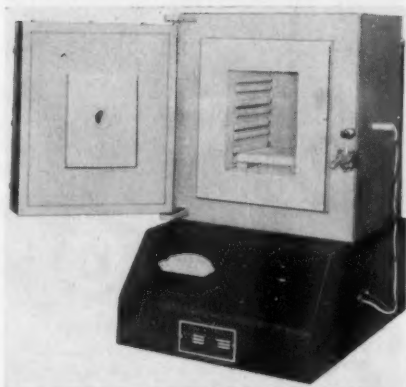


Illustration showing "Dyna-Trol" Furnace

wise and a thermocouple selector switch.

Elements are supported by means of specially designed "Dyna-Glow" element holders. These element holders have excellent heat transfer properties, and a low mass characteristic keeps overshoot and undershoot of the temperature control point, in the case of automatic temperature control, to an absolute minimum. Control bands or "dead zones" of plus-minus 3 degrees F. are easily attained. Excellent element support and easy element replacements are other important element holder features. Fully automatic temperature controlled models are also available.

For more data circle 80 on Reader Service Card



"Jorgensen"
REG. U.S. PAT. OFF.

and **"Pony"**
REG. U.S. PAT. OFF.

CLAMPS

ASK YOUR SUPPLIER.
send for free catalog.

ADJUSTABLE CLAMP CO.
the clamp folks 436 N. Ashland, Chicago 27, Ill.

For more data circle 355 on Reader Service Card

June, 1956

**Production
UP
at NORTHROP**



KNU-VISE clamps help cut drilling time

MODEL HS-400

Wherever fast, positive material holding is required—Knu-Vise toggle-action clamps are helping manufacturers do a better job.



One application is shown above. This time Knu-Vise clamps are in use on a special fixture developed by Northrop Aircraft engineers for simultaneous drilling of seven rocket pod orifice holes for the Northrop F-89 Scorpion. Drilling time has been reduced from 10 hours to 45 minutes—including set-up time.

REMEMBER—if you have a holding problem—Lapeer Mfg. Co. offers a wide range of hand, air and oil operated clamps to increase efficiency and lower costs. Our catalog contains complete information. Write for your copy today.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

**KNU-VISE
PRODUCTS**

LAPEER MANUFACTURING CO.

3048 DAVISON ROAD

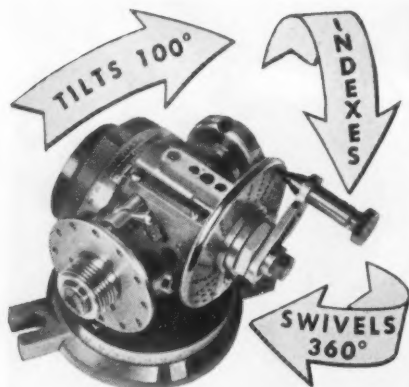
• LAPEER, MICHIGAN

WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

For more data circle 356 on Reader Service Card

June, 1956

modern machine shop 211



FOR FASTER PRODUCTION

THE ELLIS DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really rugged tool room or production tool that's designed for unusual versatility. Its universal motions—swiveling in two planes—will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!

N
NICHOLS MORRIS
M
CORPORATION

**76-H MAMARONECK AVE.
WHITE PLAINS, N. Y.**

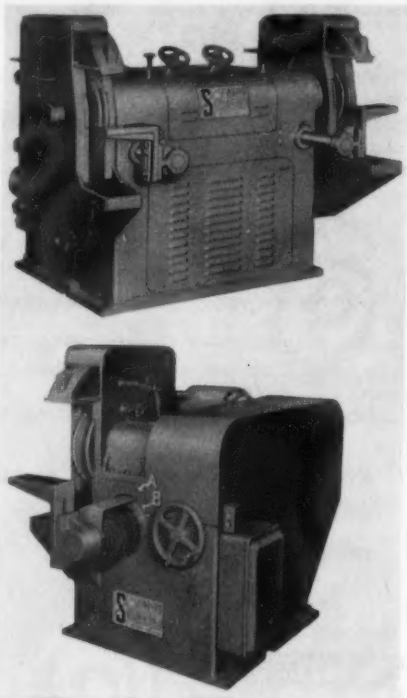
For more data circle 357 on Reader Service Card

212 modern machine shop

new shop equipment . . .

SNAGGING GRINDER IS AVAILABLE IN SINGLE AND DOUBLE-END TYPES

The Foundry Grinder Division of The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has announced a line of infinitely variable speed snagging grinders, which includes a twin-motor double-end grinder and a single wheel snagging grinder. Referring to the accompanying illustration, the twin-motor double-end grinder, shown at the top, is a 2-in-1 ma-



**Illustration showing Standard Twin - Motor
Double-End Snagging Grinder (above) and
Single Wheel Snagging Grinder (below)**

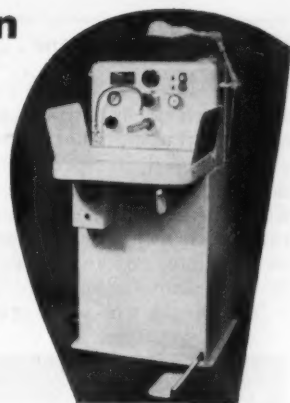
June, 1956

For Honing Perfection

nothing does it like the

NEW *Model H.M.* **HONEMASTER**

The First Real Advancement
in manually operated honing machines.



Hydraulic system assures

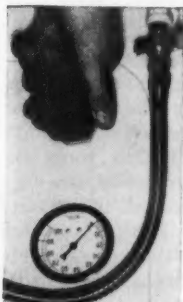
CONSTANT PRESSURE

with no fall off due to stone wear or stock removal.

Stone pressure control

ADJUSTABLE TO MATERIAL and DIAMETER OF PIECE

Constant cutting action always! Hydraulic system also
operates clutch and brake mechanism.

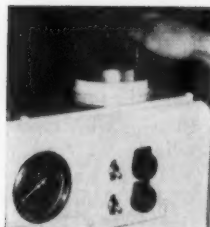


INFINITELY VARIABLE SPINDLE SPEED

250 to 1150 r.p.m.

The right speed for
work of any diameter,
material or finish.

Easy-to-read tachome-
ter.



Spindle has replaceable
hardened pilot bushing,
mounted on factory
sealed bearings. Elim-
inates constant lubrica-
tion. Machine operates
by foot pedal while
standing, or knee pedal
while sitting.

All standard Superior
mandrels adaptable.



SINGLE CONTROL SIZING DIAL INDICATOR

Set indicator by honing first piece to finish size.
Compensate only for stone wear thereafter.
Sizing dial indicates when piece is coming to
size.

SUPERIOR HONE CORPORATION

1615 Elreno Street

Elkhart, Indiana

Please send details on the Honemaster and free catalog and prices
on other Superior Honing machines.

NAME _____

FIRM _____

STREET _____

CITY AND STATE _____

NAME OF SUPPLIER _____

For more data circle 358 on Reader Service Card

new shop equipment . . .

chine; each side is entirely independent; each wheel operated at its own correct-efficient speed, irrespective of wheel diameter. One wheel may be stationary, while the other wheel is operating. The machine is available in three sizes with two $7\frac{1}{2}$ h.p. or two 10 h.p. motors for 30-inch diameter wheels.

The single wheel snagging grinder,

shown at the bottom of the illustration, is available with the wheel on either the left or right-hand side. It is offered in sizes with 20 inch wheel, 5 h.p. or $7\frac{1}{2}$ h.p. motor; 24 or 30 inch wheel with $7\frac{1}{2}$, 10, 15, 20, 25, 30, 40 or 50 h.p. motor.

Features of each grinder include structural plate steel dual (double protection) wheel guards with stress relieved welds and a safety interlock, which is positive in maintaining exactly 9,000 s. f. p. m.

throughout wheel life. This latter feature allows the wheel to have the same cutting action when worn as when the wheel was first mounted. No tools or wrenches are required to accomplish a speed change. Speed change is made while the grinder is running — the operator can compensate for the slightest of wheel wear merely by a partial clockwise turn of the hand-wheel.

The single wheel grinder illustrates the ("A") grinding flash deflector and the ("B") accordion protector covering the corrosion resisting bar which traverses the work rest to compensate for wheel wear. No tools are necessary for



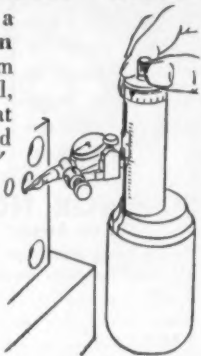
with GREIST MICRO-HEIGHT® GAGE

Precision-built Micro-Height scribes like a vernier height gage, **reads faster than your micrometer!** You read direct from **zero at base to 3"**. Hundredths on barrel, thousandths on large-diameter head that **cuts reading time!** Precision ground and lapped Riser extends range to 9"

CUT INSPECTION TIME!

Add your dial indicator to quickly read distances between holes, surfaces.

Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself! **Call your distributor or write:**

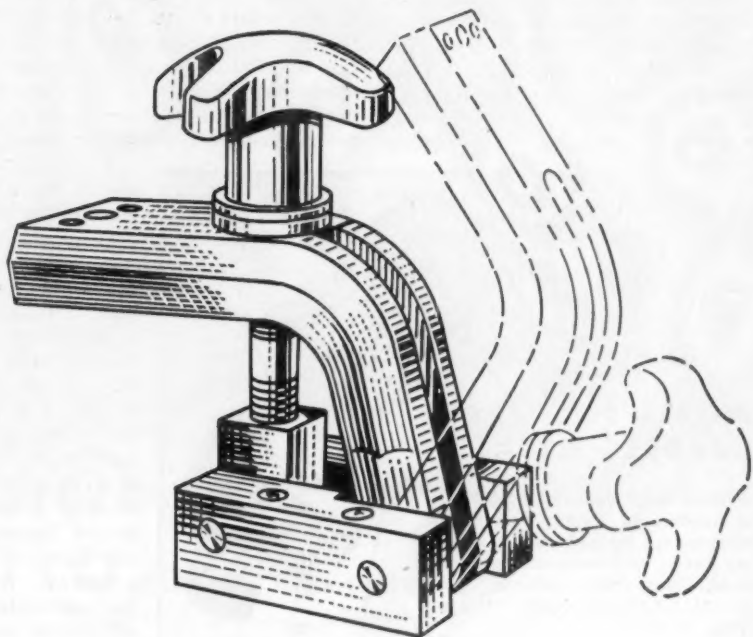


THE **GREIST** MANUFACTURING CO., 496 BLAKE ST., NEW HAVEN 15, CONN.

Precision Products since 1871.

For more data circle 359 on Reader Service Card

The New Lodding Self-Retracting Clamp



Positive clamping . . . time saving . . . fastest and strongest. No need to pull clamp strap away; it comes back by itself. Alloy steel forging. Lodding Retracting Clamps are made in four sizes, four styles—hand knob, hand cam, nut and air operated.

LODDING, INC.

WORCESTER 1, MASSACHUSETTS

Factory Warehouses

Precision Tool Sales

Bagby Engineering Co.

417 E. Florence Ave., Los Angeles 3, Calif.

1047 Forest Ave., Evanston, Ill.

For more data circle 360 on Reader Service Card

new shop equipment . . .

access to the grinding wheel. The hinge door has permanently secured latches of plate steel. Handle permits convenient removal of door, if desired. The right angle flange at each side of the guard completely encloses the grinding wheel for safety and maximum exhaust efficiency.

For more data circle 81 on Reader Service Card

GRINDER HANDLES LARGE SINGLE-POINT TOOLS

Equipped for either wet or dry face grinding of large, single-point tools, a double-end tool grinder is being offered by Ex-Cell-O Corp., Detroit 32, Mich. Designated as Style 48-B, the grinder can be used for roughing out all sizes of shanks. With suitable wheels the machine will recondition tools of high speed steel, cast alloys and carbides.

Two 10-inch plate mounted wheels are used. The wheel shaft rotates in heavy-duty, double-row ball bearings, permanently lubricated and sealed against entry of dirt and abrasive particles. The spindle drive is through a V-belt from a reversible motor located in the base of the grinder. Ample tool rest tables are adjustable to required tool sharpening angles and may also be adjusted to compensate for wheel wear.

Carefully engineered safety features are standard with the machine. Included are heavy sheet metal guards attached to the table brackets, and moving with them. These prevent tools

BLADES

ROLLS

TOOLS

DIES

BAR STOCK

METAL CARBIDES CORPORATION

TALIDE®

YOUNGSTOWN 12, OHIO

**HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY**

A cartoon character is shown running towards the right, carrying a large block of metal carbide.

For more data circle 361 on Reader Service Card

Why the Die Maker Prefers **PRODUCTO** Die Sets



Volkert Stampings, Inc.

The die maker likes to work with Producto Die Sets

He knows Producto die sets are easy to assemble—especially those equipped with the unique new Qwik-Fit Guide Pins*.

He has confidence in the consistent accuracy of Producto sets. He has found that they always align his dies correctly.

He knows he can choose from a variety of thicknesses the Producto die set that meets the strength requirements of his die.

He favors Producto die sets because they are dependable. They will perform on the press as well as they did in tryout.

He likes the attractive, streamlined appearance of Producto sets. They make his dies look better and increase his pride in these products of his craftsmanship.

*Patent Pending

He knows that a nearby Producto warehouse can supply any catalog die set he needs...and that orders for specials are promptly processed. He can count on having the die set by the time he needs it.

The die maker has found that all of his requirements are met by Producto die sets. You will, too, when you place your order with Producto.

DIE SET DIGEST, our eight-page quarterly, contains valuable data for designers, makers and users of dies. Write to have your name added to mailing list.



THE PRODUCTO MACHINE COMPANY
910 Housatonic Ave., Bridgeport 1, Connecticut



PRODUCTO

Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

For more data circle 362 on Reader Service Card

June, 1956

modern machine shop 217

new shop equipment . . .

from dropping into the wheel recesses. Other conventional guards also insure safety for the operator.

A pressure coolant system, having its own tank and pump, is provided with the Style 48-B tool grinder. Coolant at each wheel is controlled by an individual valve, and splash guards pre-

TROYKE

ROTO-INDEXER



INDEXING

Rapid

Positive

Accurate

CHUCK or T-SLOTTED INDEXING TABLES—FOUR MODELS

Hand operated. Unique patented block out arrangement. Can be used in vertical or horizontal position.

WRITE FOR FREE CATALOG No. 22.



TROYKE MFG. CO.

380 ORCHARD STREET
CINCINNATI (SHARONVILLE), OHIO

For more data circle 363 on Reader Service Card



View of Ex-Cell-O Style 48-B Tool Grinder

vent waste of coolant when the grinder is operating.

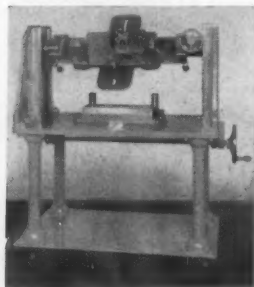
An accurate protractor tool guide, a universal adapter for grinding the top rake of tools, a diamond wheel dresser and toolholders for both round and square tools are available as extras.

For more data circle 82 on Reader Service Card

★ ★ ★

ROTARY SWAGING MACHINE HAS STREAMLINED DESIGN

The Torrington Co., Swaging Machine Division, 730 North St., Torrington, Conn., has introduced a stream-



HAUSER Die Handler

For tool rooms, inspection, press and try-out departments.

Mobile or stationary. 180 degrees rotation of punch. Locks in any position. 24" x 40" base table. Ball bearing construction.

Dealer inquiries invited.

WRITE FOR DETAILS

HAUSER MFG. CO.

234 MILL STREET
ROCHESTER 14, N. Y.

**\$987 F.O.B.
FACTORY**

For more data circle 364 on Reader Service Card

BESLY

Precision Tooling and Gaging Application Service

- SAVES YOU ENGINEERING HOURS
- GIVES YOU HIGH PRODUCTION
- REDUCES YOUR COSTS

Determining the style and type of cutting tools and gages that will do a given job best often takes engineering hours that you can ill afford to spare these days.

You can save many of these hours with Besly's Application Service. Besly Service Engineers are completely up-to-date on cutting tool and gage selection and application. They can analyze your jobs, select the right tool, and help lay out tooling set-ups to achieve longer tool life, less downtime, fewer rejects, and increased production. This service includes the development of "special" tools to fit your special needs. If you'd like proof of how it can work for you, write us.

**YOU GET ASSURED COST-CUTTING QUALITY
WITH BESLY CUTTING TOOLS and GAGES!**

COMPLETE LINES

PRECISION
ACCURACY
AND QUALITY

STANDARDS
AVAILABLE
FROM STOCKS

FAST DELIVERY
ON "SPECIALS"

BESLY

TAPS

**BESLY**

DRILLS

**BESLY**

REAMERS

and
END MILLS**BESLY**HIGH SPEED
TOOL BITS**BESLY**

METRO

CARBIDE
TIPPED
TOOLS

standard and special

**BESLY**

METRO

GAGES



Engineering, Service,
and "Specials" are a
BESLY SPECIALTY!

BESLY**BESLY-WELLES**

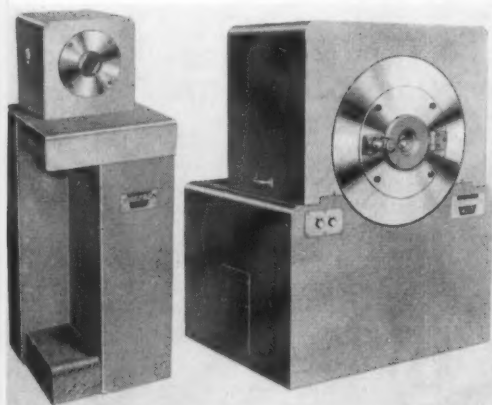
CORPORATION

Est. as C. H. Besly & Co. 1875

108 S. Dearborn Avenue, South Beloit, Illinois

For more data circle 365 on Reader Service Card

new shop equipment . . .



Torrington Light-Duty and Heavy-Duty Model Streamlined Rotary Swaging Machines

lined rotary swaging machine, featuring maximum capacity for size and power, convenient location of controls, easy access for maintenance, integral storage space and modern styling and color. Moving parts of the machine are made of high grade tool steels. Controls, gatehandle and flywheel guard opening are located on the left side of the machine for easy operation. The base design allows ready access to the power and drive mechanism for easy maintenance.

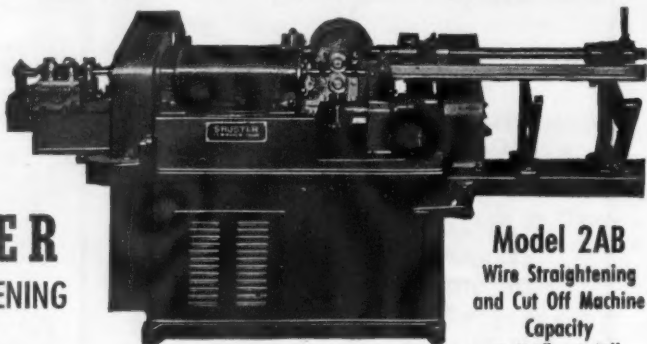
The machine is available in three light-duty models, complete with motor and stand, containing storage space for dies and tools. These models can also be supplied without a stand, hood or motor for use as bench machines. The Torrington Swaging Machine is also available in six heavy-duty models for larger size solid and tubular stock.

For more data circle **83** on Reader Service Card

★ ★ ★ ★ ★

ECONOMY MINDED?

SHUSTER WIRE STRAIGHTENING and CUT-OFF MACHINES



Model 2AB
Wire Straightening
and Cut Off Machine
Capacity
3/16" - 3/8"
Basic Wire

• There is a SHUSTER for every wire straightening job from .025 to 1/4" diameter. Over 30 models to select from.

Write today for our recommendation, describing your needs. No obligation whatever.

Mfd. by **METTLER MACHINE TOOL, INC.**, 157 Adeline Street, New Haven, Conn.

For more data circle **366** on Reader Service Card

...ask **BAIRD** about it



Find out why this **BAIRD Model H** is the best Tumbling Machine for many installations

Tumbling operations have become one of industry's most effective low-cost production methods . . . with wide-open opportunities for increasing application.

The Baird Model H machine . . . entirely new in design . . . has been developed with these important expanding applications in mind. It is essentially a production-line machine . . . built to pay out in freedom from maintenance, long service life, and operating ease when installed for constant-duty service.

It is "clean limbed" and efficient, with "finger-tip," effort-saving controls for either manual-hydraulic or power tilting. All types of barrels may be accommodated, and Baird furnishes a complete selection, including electrically heated types.

If your requirements call for tumbling machines capable of constant, dependable production-line operation at minimum cost per service hour, this NEW BAIRD MODEL H will be your best selection. Our experience is yours to call upon . . . "Ask BAIRD about it." Write Dept. MM.

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL
FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

4BA56

For more data circle 367 on Reader Service Card

June, 1956

modern machine shop 221

new shop equipment . . .

ELECTRIC IMPACT WRENCH

Designated as the No. 56 Speed-Wrench, a 1/2-inch square-drive universal electric impact wrench which features "one-hand operation" through a finger-tip reverse button located in the handle behind the starting trigger has



Thor No. 56 Electric Impact Speed Wrench

WHOOT MON!



You really get your money's worth when you buy precision screw machine products made by "you know W.H.O.*"

**CAP SCREWS • COUPLING BOLTS
SET SCREWS • MILLED STUDS**

... our specialty.

***Wm. H. Oramiller Co.
YORK, PENNA.**

For more data circle 368 on Reader Service Card

been announced by Thor Power Tool Co., Aurora, Ill. Single switch efficiency is made possible by the concentration of all electrical connections in the handle. According to the manufacturer, long life is aided by the provisions made for reversing the current instead of shifting the commutator brushes.

The impact wrench measures 9 5/8 inches long overall, weighs 7 pounds and has a 1 7/16-inch offset. It develops forward and reverse speeds of 1,900 r.p.m. and delivers 1,900 blows per minute. Striking jaws rotate to present a new surface for each blow as it is struck. Designed for fast nut setting and removal, the tool can also be used for drilling, screwdriving, tapping and driving or removing studs.

For more data circle 84 on Reader Service Card

**Now Available in . . . "SPRAY ON" CANS
and in "BULK"**



design layout ink

Order it the way you use it — in handy 12-oz. Aerosol spray cans, or by the pint, quart, gallon or barrel in bulk! Crown ink dries to an excellent scribing texture in a minute! Ideal for pattern, "OK" or "reject" marking.

Contact your distributor,
or write:

CROWN INDUSTRIAL PRODUCTS CO.

809 Amsterdam St., Woodstock, Ill.


For more data circle 369 on Reader Service Card



**Just Press the
Trigger on the Can**

Specify CLEVELAND'S

WE CAN FURNISH YOU
WITH PUNCHES AND DIES
TO FIT ANY MAKE OF
PUNCHING MACHINE



399 sizes of these standard punches
241 sizes of these standard dies
carried in stock for immediate shipment



Established 1880

— Write For Small Tool Hand Book —

POWER PRESSES — FABRICATING TOOLS

City Foundry Division • Small Tool Department

E. 40th & St. Clair Avenue • Cleveland 14, Ohio

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • E. LANSING

For more data circle 370 on Reader Service Card

June, 1956

modern machine shop 223

new shop equipment . . .

**MACHINE MARKS 800 TO
1,000 PARTS PER HOUR**

George T. Schmidt, Inc., 1806 W. Belle Plaine Ave., Chicago 13, Ill., has announced the Model 365 hydraulic marking machine. This machine is said to provide all the functions of a larger machine for normal marking opera-

tions requiring up to 8,000 pounds pressure, with a maximum lettering length of 3½ inches.

This compact, well-designed unit is built with a heavy die slide, which operates on roller bearings. The machine features simplified controls, recessed switch-well with telltale light, quick and simple adjustment of table and die slide stroke.

The unit will mark lines of lettering with a knurl on flats up to 3¾ inches long. It will mark lettering up to 3¾ inches long on rounds rotating in cradle and up to 1-11/16 inches long on rounds which roll on table. Marking capacity is 4 lines of 1/16 inch characters, 3 lines of 3/32 or 1/8 inch characters, 2 lines of 1/4 inch characters. Rate of production is 800 to 1,000 parts per hour.

For more data circle 85 on Reader Service Card

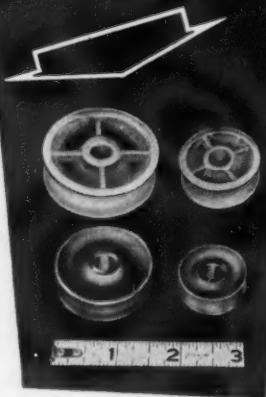


**Schmidt Model 365
Marking Machine**

CASE HISTORY OF A SHORT-RUN PLASTIC

**Nylon Pulley Saves
Sailboat Manufacturer
MONEY, WEAR and WEIGHT**

Converting from a metal machined casting to a Nylon pulley enabled a maker of sailboats to eliminate scratching and nicking of the canvas top and lacquered wood surfaces of his boats. The self-lubricating Nylon pulley eliminated the oilite bearing-type metal pulley and saved overall pulley weight as well. Cost-wise, the customer can now buy, in thousand lots, two different size pulleys, molds included, for less than 1,000 each of the old metal pulley. Additional orders will be even less.

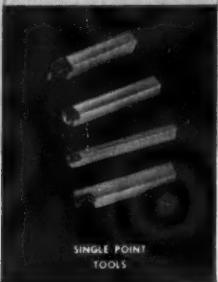


Plastic parts can save dollars and improve product usage. Consider short-run molded plastics for your product. Send a blueprint or sample for prompt quotation.

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7D, MINNESOTA

For more data circle 371 on Reader Service Card



Why These Cutting Tools are *Production Proved*

Continental is an Ex-Cell-O subsidiary.

As such, we are constantly trying out new tool designs, new methods, in Ex-Cell-O's big parts production shops.

There could be no finer "proving ground" for testing new materials and new methods. There are no finer cutting tools than "Production-Proved" tools by Continental.

Call in your Ex-Cell-O representative or contact Continental in Detroit for information about them.



55-31

Continental

TOOL WORKS

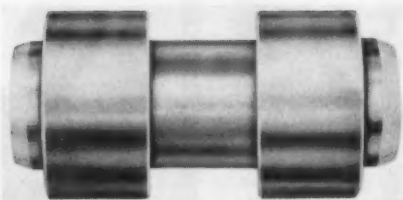
Division of Ex-Cell-O Corporation, Detroit 32, Mich.

For more data circle 372 on Reader Service Card

new shop equipment . . .

FLEXIBLE GEAR COUPLING

A spacer type flexible gear coupling, that is claimed to make it possible to remove the hubs from either shaft without disturbing the mountings of



Sier-Bath Spacer Type Flexible Coupling

the connected units, has been developed by Sier-Bath Gear and Pump Co., Inc., 9247 Hudson Blvd., North Bergen, N. J. The spacer type coupling consists of flexible hubs on both the driver and driven shafts. The center unit, or spacer, has specially designed teeth at either end cut in such a manner that they mate with each sleeve in a spline fit and have no flexibility. The two sleeves connect the driver and driven units through the spacer. The entire unit is assembled and uncoupled quickly without using wrenches or special tools, since it incorporates the same design principles as Sier-Bath's standard types, requiring no installation of bolts or alignment of flanges.

The spacer type flexible gear coupling is made in standard stock models, sizes $\frac{7}{8}$ to 3, with capacities of 4 to 80 h.p./100 r.p.m. Larger size couplings and special types can be supplied on application.

For more data circle 86 on Reader Service Card

REID

TOOL ROOM ACCESSORIES

MALLEABLE MACHINE HANDLES



CRANK



STRAIGHT



OFFSET

Finest and most complete available. Made in 3 styles and in a large variety of sizes. Well proportioned. Neat in appearance. Smooth finish. Stands up under severe usage. Low prices. ALSO plastic and steel ball handles. C.I. hand knobs, compression springs, etc. Finest quality. Low prices.

FREE
 NEW 60-Pg.
CAT.

REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 373 on Reader Service Card

MODEL 500 CONTACT WHEEL BELT GRINDER

The Fastest Known Method
 of Increasing Production



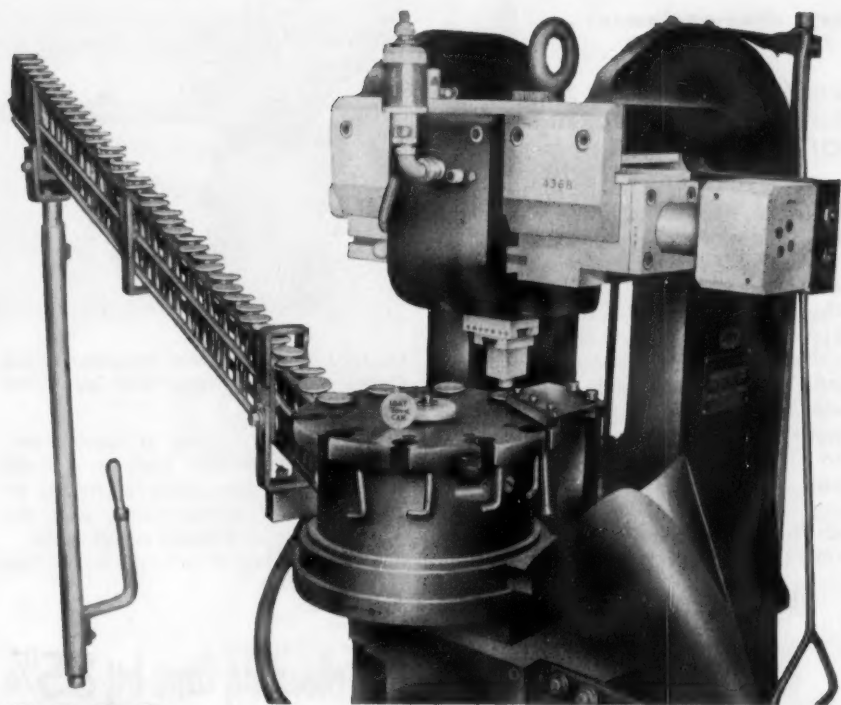
Rotates 360° and locks in any
 operating position desired.

WRITE FOR COMPLETE INFORMATION
 ON INCREASING YOUR PRODUCTION



B & E MFG. CO., INC.



2108 EAST 31 STREET
 KANSAS CITY 9, MISSOURI

For more data circle 374 on Reader Service Card





3600 marking operations per hour

 This  machine, equipped with a Dial Feed, marks 3600 automotive engine valves per hour. The Dial picks up valves from the inclined chute, positions them for marking, marks and discharges them into the funnel. The Dial Feed is hydraulically operated through the machine circuit.

This is only one member of the extensive and ever-growing line of  marking devices. Whatever your marking problem may be, you can be sure of a rapid and entirely satisfactory solution from .

GEO. T. SCHMIDT, INC.
 1806 West Belle Plaine Avenue
 Chicago 13, Illinois

Write today, without obligation, for further information, or for an appointment with a helpful  Sales Engineer.

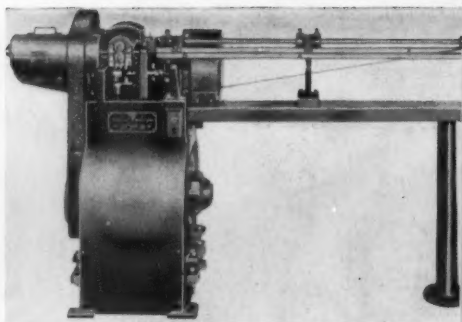
 **"IF IT'S WORTH MAKING, IT'S WORTH MARKING"**

For more data circle 375 on Reader Service Card

new shop equipment . . .

ROLLER TYPE CLUTCH AND CUT-OFF CAM FEATURED IN WIRE CUTTING MACHINE

A solenoid-actuated, roller type clutch and cut-off cam are features of the improved Shuster Model A Fine Wire Straightening and Cutting Machine, manufactured by Mettler Machine Tool, Inc., 157 Adeline St., New Haven, Conn. This constant speed machine, which has a capacity of 0.020 to 0.040 inch or 0.025 to 1/16 inch diameter basic wire, in providing an instantaneous "feather-touch" cutoff, is said to insure exact accuracy of length of cut and clean, even, swell-free wire ends. Replacement of the former mechanical clutch and target also reduces operational supervision while increas-



Shuster Model A Fine Wire Straightening and Cutting Machine featuring Roller Type Clutch

ing rate of production at same time.

The machine also features a 5-die straightening flier, drive shaft and fly wheel, V-belt motor drive, and the lightning action Shuster cutoff knife.

For more data circle 87 on Reader Service Card

★ ★ ★ ★ ★



MONEY-BACK TRIAL OFFER

Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

For more data circle 376 on Reader Service Card

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time. . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

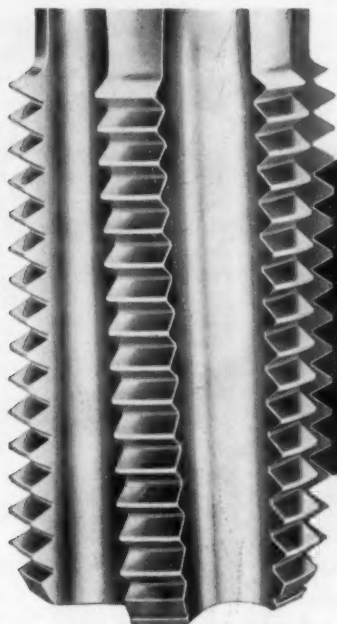
P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.30 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.35 per gallon, f.o.b. Dayton.

PROTECT-O-METAL

G. W. SMITH & SONS, INC.

5407 KEMP ROAD, DAYTON, OHIO



TRADITIONALLY TOPS IN TAPS...

Hanson-Whitney, the established hall-mark in the screw thread field of machine tools, cutting tools and precision gages . . . offers **single source** uniformity, dependability and quality.

Consult Hanson-Whitney on all threading requirements . . . our field engineers can quickly assist in all problems.

Write for further information and literature -

Hanson-Whitney

COMPANY

DIVISION OF THE WHITNEY CHAIN COMPANY

173 BARTHOLOMEW AVENUE

HARTFORD 2, CONN.

TAPS • THREAD GAGES • HOBS • CENTERING MACHINES • THREAD MILLING MACHINES AND CUTTERS

For more data circle 377 on Reader Service Card

June, 1956

modern machine shop 229

new shop equipment . . .

CUT-OFF MACHINE FOR WIRE AND TUBING

Black & Webster, Inc., 445 Watertown St. Newton 58, Mass., has introduced an automatic cut-off machine named "Electrocut." An all-electric, packaged unit, it rapidly and economically cuts bare and insulated wire, spa-

ghetti tubing, plastic tubing, and so on, to predetermined lengths. It can be plugged into any 115-volt, 60-cycle, single phase outlet.

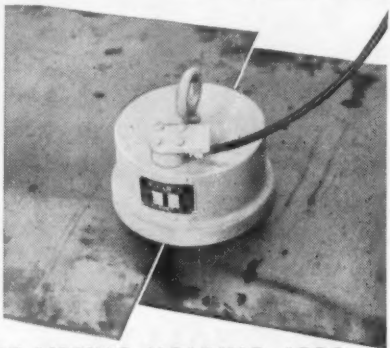
The machine is capable of handling materials up to $\frac{3}{8}$ inch in diameter. By turning a handscrew and removing or replacing switch actuating buttons, it can be continuously adjusted to cut lengths from $\frac{3}{4}$ to 13 inches. The standard Electrocut provides repeat accuracy of plus or minus $\frac{1}{32}$ inch. How-

ever, greater accuracy can be obtained with slight modifications at extra cost. Operating cost is said to be negligible.

The machine draws the material directly from the spool and automatically cuts off until the spool is empty. It then automatically shuts off. Thus, an operator is needed only for set-up.

Electrocut cuts off material equi-

STEARNS "Hoist-Clamp" Magnet Pays for Itself...



ON DOZENS OF LIFTING-HOLDING JOBS

- **Clamp for Tack Welding**

This handy Stearns magnet holds plates firmly in place for tack weldings — saves time and labor — eliminating misalignment. Equally valuable for welding I-beams together, dozens of other welding jobs.

- **Hoist for Die Blocks**

Heavy die blocks and other small but heavy parts can be lifted, positioned and placed quickly and easily with the Stearns "Hoist-Clamp" Magnet.

- **Quick On — Quick Off**

Hoist-Clamps speed work. Magnet is energized or de-energized just by turning current on or off. No slings, hooks, etc., are needed.

Five low-cost sizes—available in 4, 7, 10, 12 and 15-inch diameter sizes. Maximum lifting capacity—5,000 lb. Smallest weighs 7 lb, largest 180 lb.

Write today for bulletin 135-D.

1156

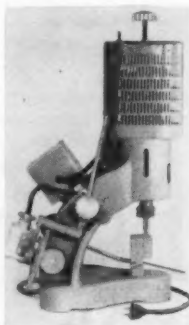
MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

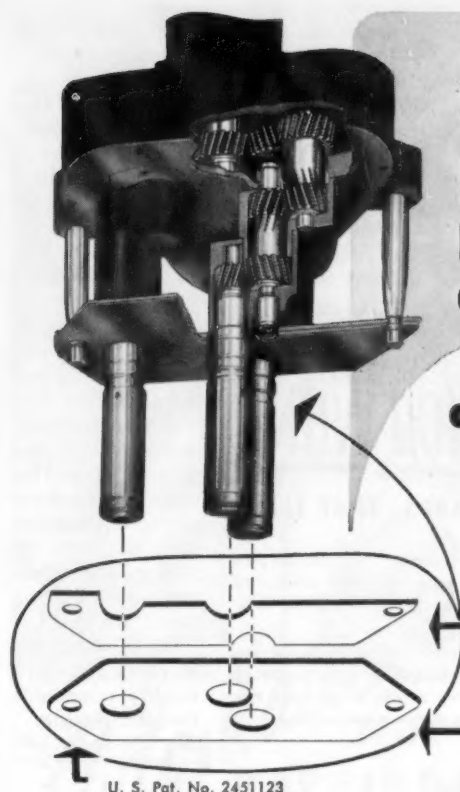


Stearns Magnetic, Inc., 664 S. 28th St., Milwaukee 46, Wis.

For more data circle 378 on Reader Service Card



**Electrocut Automatic
Cut-Off Machine**



U. S. Pat. No. 2451123

only
**WISCONSIN
 DRILL HEADS**
 have both Locating
 and Locking Templates

**an Exclusive
 Patented
 Feature**

1 Locating Template

Each spindle swings into half-holes of locating template for fast, accurate positioning.

2 Locking Template

Full-hole template fits over spindles, locking them into exact position.

Other Wisconsin Drill Head Features

WIDE RANGE—Each spindle has 3 centers to provide maximum range of bolt circle adjustments. U. S. Pat. No 2441722.

LONG LIFE—Helical gears and other moving parts are hardened to resist wear.

STANDARD PARTS — Replacement parts for all standard models always in stock.

SIZE AND CAPACITY—There are 6 models of Wisconsin Adjustable, Multiple Drill Heads, each in 2 to 8 spindles. Capacity: Wire Size thru 1½" dia. Operating Speeds to 4000 r.p.m.

In addition to Standard Multiple Adjustable Center Drill Heads, Wisconsin builds Special Fixed Center Drill Heads, Lead-Screw Tapping Units, Fixture Bases, Special Machines — both Index and Transfer Type.

Write for Name of Nearest Representative



WISCONSIN DRILL HEAD CO.

4983 N. 124th STREET • BUTLER, WISCONSIN

For more data circle 379 on Reader Service Card

new shop equipment . . .

valent to $\frac{1}{8}$ inch diameter mild steel wire at rates ranging from 60 to 150 per minute, depending upon the length of the cut-off stroke. It can handle any spool where the pull required does not exceed three pounds. It feeds the material in steps of 4, 8, 12 or 24 feet per minute, depending upon the length cut.

A variable-speed friction drive is used to feed the wire under the carbide cutting tool, which is motivated by a solenoid. A cone pulley is used on the motor drive so that feeds can be varied. The wire is pulled from the reel by a rubber-covered drive and idler pulley and is fed into a tube, which leads to the cutting die. A variable-speed friction wheel drives a disk, which has buttons that actuate the micro switch.

This switch energizes the solenoid, cutting off the material being fed through the die. The length of the material cut depends upon the time between switch actuation and the rate of feed of the material. Both cutting tool and die, through which the wire is fed, are readily removable for sharpening.

For more data circle 88 on Reader Service Card



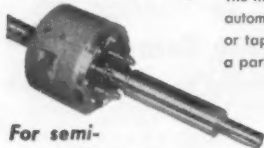
Heads...You Win!

U. S. DRILL HEADS, THAT IS!

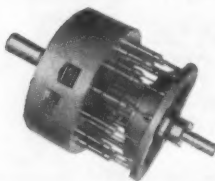
Regardless of the size of your shop, if you have high production jobs, you'll find an extraordinary reduction in tooling and manufacturing costs when you use U. S. Drill Head.

The heads shown here, moderate in cost, are for use with automatic chucking machines and turret lathes, for drilling or tapping operations. They provide, in most cases, that a part can be completely finished in one handling.

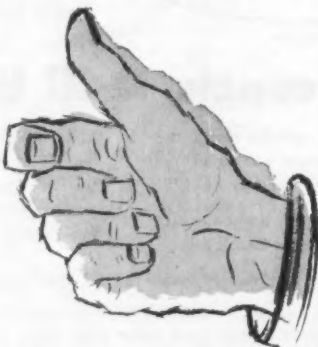
For automatic setup.



For semi-automatic setup.



For semi-automatic setup.



Manufacturers of all types of adjustable, fixed center and individual lead screw tapping heads.



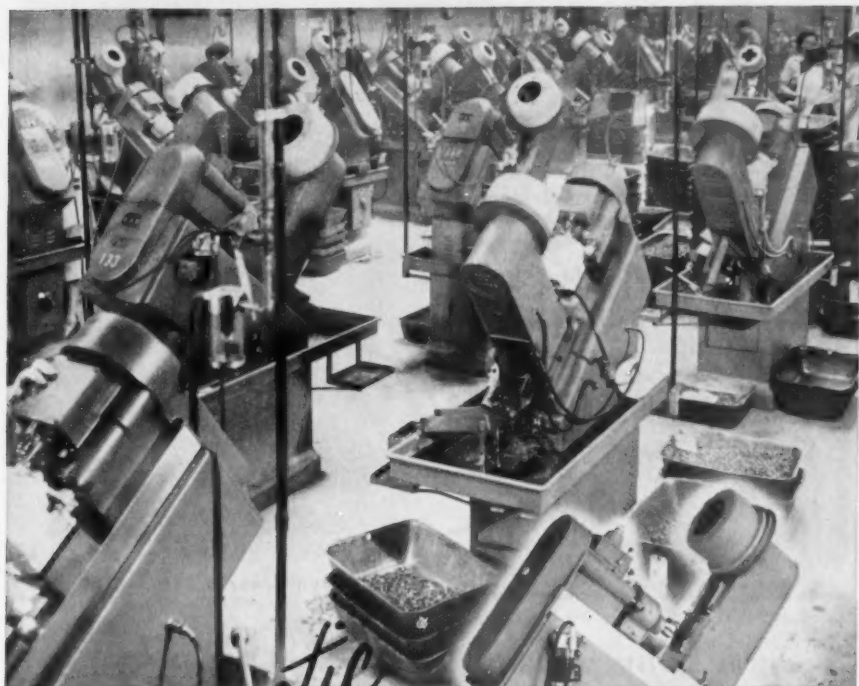
THE UNITED STATES DRILL HEAD COMPANY

BURNS STREET • CINCINNATI 4, OHIO

For more data circle 380 on Reader Service Card

HIGH SPEED DRILL

High Speed Hammer Co., Rochester, N. Y., has announced the general availability of their Class 8 Sensitive Drilling Machine. Until now this product has been made exclusively for the U. S. Government. The high speed drill is available



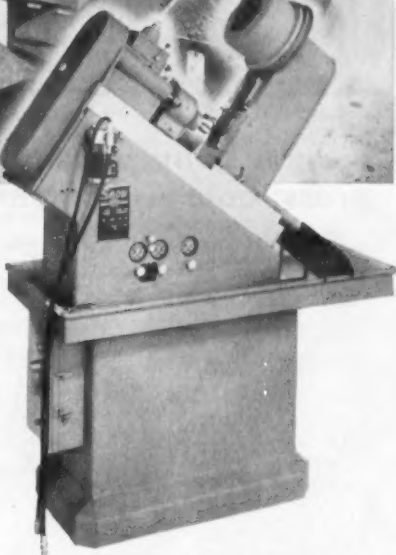
Automatic

NUT TAPPING MACHINES

This installation at Shakeproof, Division of Illinois Tool Works, Elgin, Illinois, is an illustration of productivity—with precision.

Simplicity of set-up and lower operational costs can make your Nut Tapping Department one of the most efficient and profitable in your plant. Submit samples and prints for a comparison with your present method.

VERTICAL DRILLING MACHINES
VERTICAL TAPPING MACHINES
VERTICAL THREADING MACHINES
TWO SPINDLE MACHINES
ANGULAR MACHINES
NUT TAPPING MACHINES
HORIZONTAL MACHINES
DRILLING AND TAPPING UNITS
AUTOMATIC JIGS AND FIXTURES
DRILL PRESS TAP HEADS



SNOW

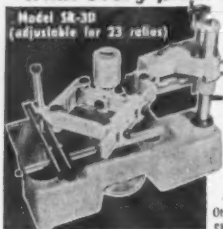
MANUFACTURING COMPANY
435 EASTERN AVENUE, BELLWOOD, ILL.
(Suburb of Chicago)

For more data circle 381 on Reader Service Card

new shop equipment . . .

with two drives, giving spindle speed ranges of either 2,450, 2,815, 3,080 and 3,540 r.p.m. or 2,450, 3,030, 4,810 and 6,000 r.p.m. It drills to the center of a 3-inch circle and has a 9/16-inch diameter spindle, with a spindle feed of $2\frac{1}{4}$ inches. Distance from chuck to base is 14 inches maximum, chuck to

What every plant is looking for...



...the new all-purpose
**SCRIPTA®
PANTO-GRAVER**

ENGRAVES — nameplates, dials, panels, tools.

COPIES — diecasting moulds, embossing punches, etc.

CUTS — costs and time

Other models exist to solve every engraving problem. Write:

SCRIPTA? c/o this magazine or: W. F. WOLF MACHINERY CO.
2910 Santa Fe Avenue, Los Angeles, 58, Calif.

AGENTS REQUIRED FOR ALL 48 STATES

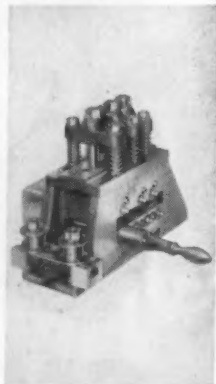
For more data circle 382 on Reader Service Card

economically priced press room equipment

DURANT Stock Straightener

Plain and Motor
Driven STRAIGHT-
ENERS. Made in
18 models.

Manufacturers of
Stock Reels, Roll
Feeds, Straighteners,
Scrap Choppers, Die
Pullers, Foot Presses,
Coil Cradles, Press
Guards, Stock Oilers.

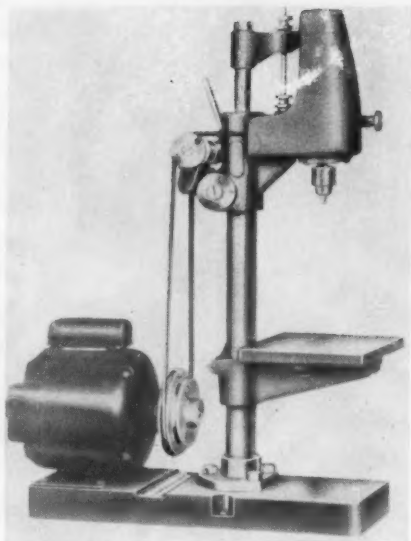


WRITE FOR NEW FREE CATALOG

DURANT TOOL SUPPLY Co.
PROVIDENCE 3, RHODE ISLAND

For more data circle 383 on Reader Service Card

234 modern machine shop



High Speed Class 8 Drilling Machine

round table, $9\frac{1}{2}$ inches. Occupies bench space 7 x 19 inches and stands 25 inches high. The machine has a capacity for No. 80 to $\frac{1}{4}$ -inch drills.

The new drill comes with $5\frac{1}{8}$ -inch round table. Optional 6 x 8-inch rectangular table overlaps the base to form continuous work surfaces when set up in gangs. It is standard with 110 volt, single phase motor with cord, switch and plug. Other motors are available.

For more data circle 89 on Reader Service Card

TEMPERATURES

AT A GLANCE



PYRO SURFACE PYROMETER

Quick-acting, lightweight and rugged...unsurpassed in accuracy. Large direct reading scale, automatic cold-end compensator, shielded steel housing. Wide selection of thermocouples and extension arms. Five standard ranges: 0-300° F. to 1200° F.; also special and sub-zero ranges. Write for free Catalog No. 168.

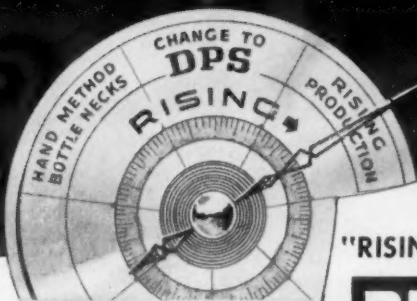
THE PYROMETER INSTRUMENT CO.
Bergenfield 42, New Jersey

For more data circle 384 on Reader Service Card

June, 1956

Is your production barometer

up?



You Get a

"RISING" PERCENTAGE WITH

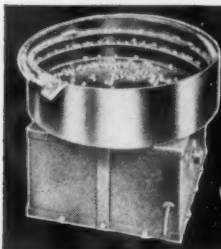
DPS

**POWER DRIVEN
SCREWDRIVERS**

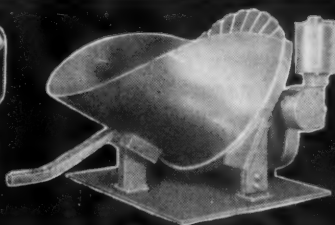
and **SELECTIVE PARTS FEEDERS**

Widely Adaptable to Individual Requirements

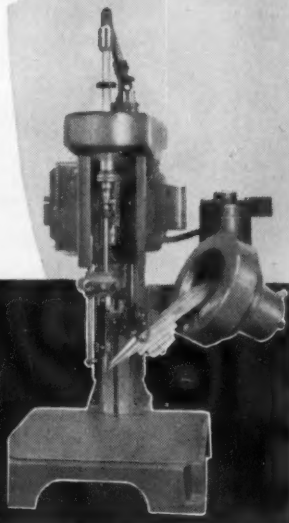
● Are you using DPS Power Equipment? If not, we urge that you get full details now . . . If you have a difficult problem, don't hesitate . . . Thirty years of experience with thousands of different applications . . . will enable us to cope with it and supply you with machines engineered to fit your needs. Progress demands DPS methods . . . Necessities in modern production where speed, economy and handling at minimum cost are so important . . . We can help you . . . Write Today . . . Ask for catalog.



BOWL FEEDER, Vibratory type, to select and feed smaller, fragile parts.



BARREL FEEDER with stationary ring cover, for heavy-duty, large production runs.



5 SCREWDRIVING MACHINES, Bench and Pedestal types. Model A pictured.

DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST.

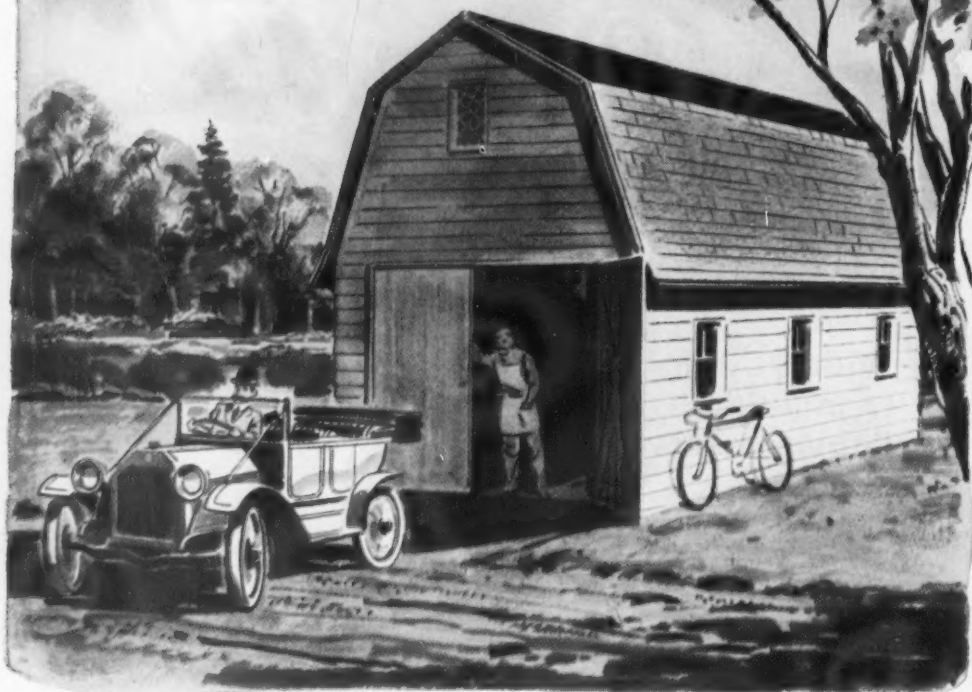
DETROIT 16, MICHIGAN.

For more data circle 385 on Reader Service Card

June, 1956

modern machine shop 235

1910 Our 46th Anniversary 1956



WHEEL TRUEING TOOL COMPANY

83-3200 W. DAVISON AVE., DETROIT 38, MICHIGAN

ESTABLISHED 1910

Southwestern Plant: Dallas, Texas

Distributors in Principal U.S. Cities—Agents Throughout the World



Radius
Forming
Tools



"Tru-Line"
Profile
Dressing
Tools



Diamond
Grit Tools
for Thread
Dressing



"Tru-Thread"
Thread
Dressing
Tools



in the American tradition

Twice a day a quick transformation overtook the old frame garage on John R Street, Detroit. At seven in the morning, the doors swung open, a spindly car chugged out and the garage became a busy little workshop. Some time after dark, the car was driven back in and, for a few hours, the workshop was a garage again.

As a workshop, it had for us a very special significance—it was here that our Company came into being and set up the first local shop devoted exclusively to making industrial diamond tools.

But, far more important, it was the first place in the whole mid-west where industry could find a complete stock of fine industrial diamonds, imported direct to Detroit, and superior to stocks previously available only in New York.

Such convenience is taken for granted nowadays and the mails deliver thousands of our diamond selections yearly, but, in those days, it was an innovation and so useful that in almost no time at all, the old frame garage (which had cost \$50.00) needed a 12-foot addition (which cost another \$50.00).

And, that was but the beginning. Today, our plants are the most modern in the industry and in the intervening 46 years our laboratories have pioneered many of the most significant innovations in diamond tool technology, including *Engineered Diamond Tools**.

Thus, in the good American tradition, a far-seeing idea, planted in the humblest beginnings, blossomed into a business that became national and international. And, this year, as we celebrate our 46th anniversary, we salute all of the many friends who helped to bring about this accomplishment.

**Engineered Diamond Tools are diamond tools engineered to the job and guaranteed to do it.*

WHEEL TRUEING TOOL COMPANY OF NEW JERSEY

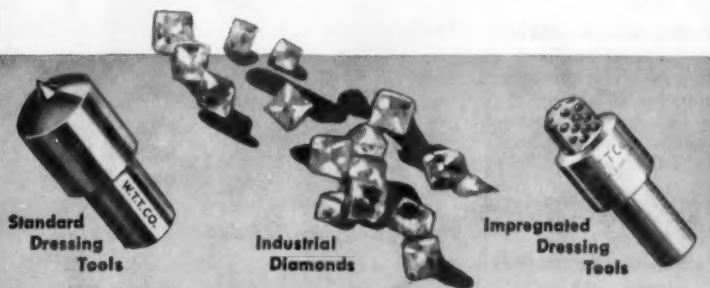
33 West Street, Bloomfield, N. J.

WHEEL TRUEING TOOL COMPANY OF CALIFORNIA

5560 Alhambra Ave., Los Angeles 32, California

WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.

575 Langlois Ave., Windsor, Ont.



Raise it! Lower it!



Increase production...

RAYMOND PORTABLE

ELEVATING TABLE

Keep materials at right height for working with a RAYMOND Portable Elevating Table. Elevates and lowers hydraulically—use it for die handling, sheet feeding, work positioning, supporting overhanging work.

30" square top rotates or locks when desired. Foot pedal operation frees hands. Floor lock holds it in place. Standard model elevates 28" to 44"; Telescopic model, 28" to 50". Both have 2,000 lb. capacity. Send for Portable Elevating Table bulletin.

The RAYMOND CORPORATION

8839 Madison St., Greene, N. Y.

For more data circle 388 on Reader Service Card

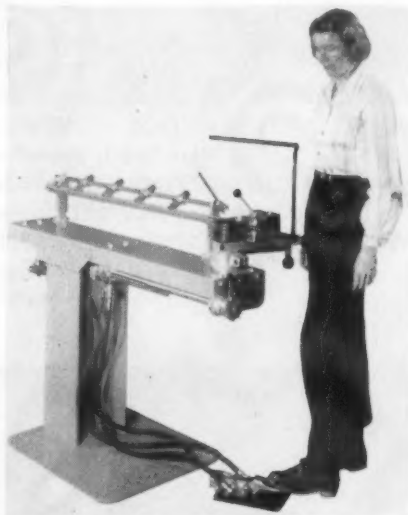
238 modern machine shop

new shop equipment . . .

BENDING MACHINE HANDLES 5/8 AND 3/4-INCH STEEL

A high speed model of the Curvit Bending Machine has been announced by Kilham Engineering, Inc., R.F.D., North Attleboro, Mass. This model has been developed especially for 5/8 and 3/4 inch steel tubing, but it is equally useful on many other kinds of material. According to the manufacturer, 500 bends per hour can be accomplished, with 450 bends per hour being the regular production rate.

In operation, the tube to be formed is slipped into the length gauge running along the top of the machine. After a bend is made, the tube is pulled forward until a new stop clicks into place, then the next bend is made. An index knob at the front of the machine, close to the operator's hand, controls the bend itself. Through four positions on the index knob, four different bends



View of the Curvit Bending Machine

June, 1956



Caught in the middle?

If grinding problems have you caught in the middle and you don't know which way to turn, switch to CINCINNATI (PD)[®] WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

Here's why you'll stop leading a dog's life when CINCINNATI (PD) WHEELS are on the job: Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels. So, we think you'll agree it's worth taking a close look at CINCINNATI (PD) WHEELS right away.

Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .



POSITIVE DUPLICATION

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

[®]Trade Mark Reg. U. S. Pat. Off.

CINCINNATI[®]
Grinding Wheels

For more data circle 389 on Reader Service Card

**Just the thing for
GREASE, OIL, GRIT and GRIME**



PHLO® Waterless Hand Cleaner

New Waterless Phlo removes all machine shop soils in a jiffy. Contains both silicone and lanolin. Safe, easy to use, Waterless Phlo is milky white, smooth in consistency. New dispenser makes using and refilling a simple matter. Management and workers alike appreciate the time-saving convenience and effectiveness of Waterless Phlo. Keep some at their fingertips always.

**TWO OLD STAND-BYS FOR SKIN PROTECTION
APPROVED AND ACCEPTED BY INDUSTRY**

Practi-Kreme . . . an effective skin protector and cleaner for over 15 years.

Phlo . . . neutral skin protector now fortified with silicones.

*Write today for literature
and free test samples*

THE
Chemical
CORPORATION

85 WALTHAM AVE. SPRINGFIELD 9, MASS.

For more data circle 390 on Reader Service Card

240 modern machine shop

new shop equipment . . .

can be made consecutively. The tube does not have to be removed from the machine between bends.

The bending is accomplished by a double, self-aligning roller, which does not have to be adjusted. The double roller moves around the stationary bending arbor and returns automatically to the starting position after each bend. The work is held by a toggle clamp, either hand or air operated. A foot control of the air cylinder powering the machine leaves both hands free for loading and unloading the work.

All bending heads are custom made for the individual job and are heat treated. Sealed ball bearings on the main shaft and an air filter and lubricator, built into the machine, are said to insure long life.

For more data circle 90 on Reader Service Card

★ ★ ★

MAGNETIC PARTS SEPARATOR

Stearns Magnetic, Inc., 664 S. 28th St., Milwaukee 46, Wis., has announced the availability of a mobile magnetic parts separator for the efficient separation of parts from deburring

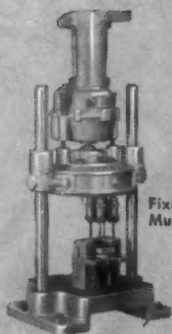


Stearns Mobile Magnetic Parts Separator

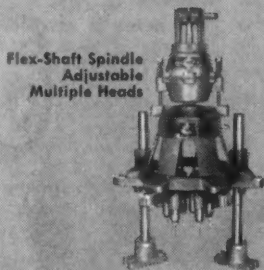
June, 1956

***Unit engineered for greater
small hole drilling
and tapping production!***

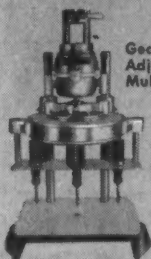
**ETTCO-EMRICK
MULTIPLE HEADS**



**Fixed Spindle
Multiple Heads**



**Flex-Shaft Spindle
Adjustable
Multiple Heads**



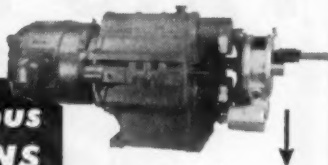
**Geared Spindle
Adjustable
Multiple Heads**

BOTH the head and workholder are designed as a unit to your requirements to give you a complete high production system capable of maintaining highest production rates on your drill press. Thus, you are not only assured of drilling and tapping the maximum number of holes at each stroke but — what is just as important — the fastest handling of the parts.

SEE FOR YOURSELF. Send samples or drawings of your parts with basic production data. We'll give you recommendations and prices.

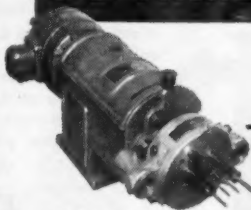
For details, ask for our Multiple Head Bulletins.

**The famous
T-D TWINS**



Automatic Drilling Unit

Completely self-contained with exclusive features that mean better work at lower cost.



**Automatic Lead Screw
Tapping Unit**

Used with Ettco-Emrick Multiple Heads, it's the ultimate in fast, automatic precision tapping.

"See your Authorized Ettco Distributor"

ETTCO TOOL CO., INC.

598 Johnson Ave., Brooklyn 37, N. Y.

Chicago • Detroit • Los Angeles • Indianapolis

Ettco-Emrick

the right equipment
for every small hole
drilling and tapping need.

For more data circle 391 on Reader Service Card

new shop equipment . . .

chips, stones, and so on. The automatic unit is said to separate 7 cu. ft. of parts and chips in 10 minutes. Equipped with a demagnetizer, the completely self-contained separator eliminates the time consuming method of hand picking or screening separation. For more data circle 91 on Reader Service Card

★ ★ ★

MICROMETER DEPTH GAGE HAS GRADUATED BASE

A micrometer depth gage with a graduated base has been announced by The Lufkin Rule Co., Saginaw, Mich. This instrument is said to measure the depth of holes, slots, projections, and so on, with micrometer accuracy. The base is graduated on one side to permit taking measurements at a specified



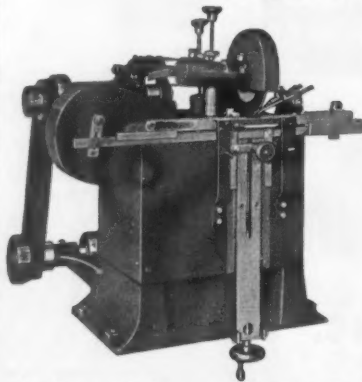
View of Lufkin Micrometer Depth Gage

distance from the edge of the work. Graduations are in 50ths (0.020) and extend 2.4 inches both sides of zero located in the exact center of base. The micrometer depth gage is available in ranges of 3 and 6 inches with lock nut, or with lock nut and ratchet.

For more data circle 92 on Reader Service Card

PAYS for ITSELF

**By Getting up to Six Times More Service
from your Hack Saw Blades**



Wardwell EC Combination Grinder will save you many dollars every year by increasing hack saw life as much as six times.

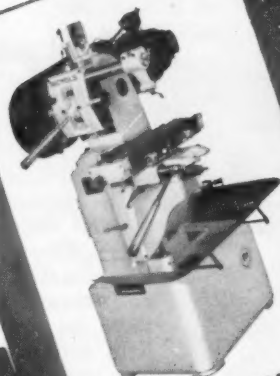
Wardwell Model EC Combination Grinder is the only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables the operator to grind a variety of blades without dressing or changing wheels.



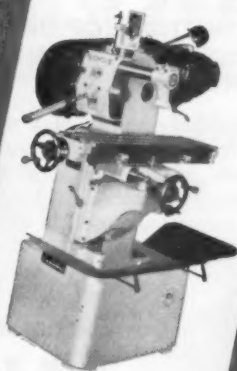
Maker of largest line of saw and tool sharpening machines

For more data circle 392 on Reader Service Card

Nichols Miller



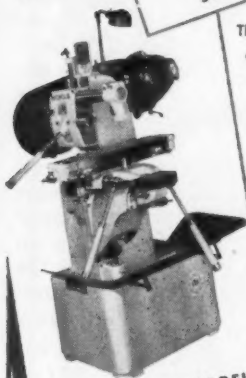
STANDARD MODEL



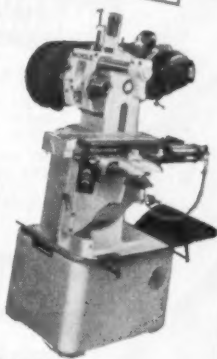
TOOL ROOM MODEL

... a complete line

The Nichols Miller, with "rise-and-fall" spindle, is one of the most precise, universal machines available today. The four models shown, fill most basic requirements—whether for single parts with simple set-up, or multiple operations on mass production jobs with tolerances to "tenths". Their versatility makes possible such operations as facing, boring, recessing, turning, slotting, key seating and contour milling, as well as regular milling. According to requirements, screw or lever longitudinal and transverse table feeds are available optionally. "The miller that uses its head" is your best choice—and one of industry's greatest values. If you want production to "tenths", investigate the Nichols Miller.



PRODUCTION MODEL



SEMI-AUTOMATIC MODEL

mi

"the miller that uses its head!"

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie "The Miller that Uses its Head" is available for free showing. May we reserve it for you?



CONDENSED SPECIFICATIONS

Table Working Surface	6 $\frac{3}{4}$ " x 21" or 30"
Longitudinal Travel (screw or lever)	10" or 19"
Transverse Travel (screw or lever)	7"
Vertical Travel—Knee	13 $\frac{1}{2}$ "
Rise and Fall of Spindle	4 $\frac{1}{2}$ "
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-H Mamaroneck Ave.,
WHITE PLAINS, N. Y.

For more data circle 393 on Reader Service Card

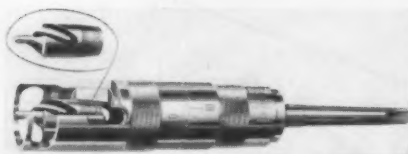
June, 1956

modern machine shop 243

new shop equipment . . .

MICROMETER-STOP DRIVER REDESIGNED TO TAKE STUB TAPER TOOLS

A new adaptation of a micrometer-stop driver now makes possible more accurate use of standard, economical stub taper combined drill and countersinks, commonly used in aircraft work



View showing Cogsdill Micro-Limit Driver

and on the center holes of all kinds of shafts. In operation, the adjustable sleeve of the driver contacts the work first. The combined drill and countersink is then fed against light spring pressure until the feed is stopped positively at a depth that can be preset in 0.001 inch increments by adjusting the driver sleeve.

The new driver, introduced by Cogsdill Twist Drill Co., Detroit 21, Mich., is an adaptation of the micro-limit anti-friction bearing driver, which has been sold for many years. It is available with straight or taper shank, and can be used in drill presses, lathes or hand drills. The stub taper combined drill and countersink illustrated is of the "Chip Flow" type.

For more data circle 93 on Reader Service Card

**Get them from Gillen
Precision Made Pieces
A Few or a Lot...**

MACHINE KEYS

Gillen makes Every Type...

To rigid tolerances, completely deburred; no further finishing required. Standard Gib Head and Plain Taper, Straight and Round End Feather Keys, Ready for use. Eliminate costly fitting at assembly line. Write for Prices.

MACHINE PARTS

Ready for Assembly...

Investigate buying from Gillen instead of making up. Every shape and size, milled, drilled, tapped, countersunk, counter-bored, heat-treated, surface ground, many metals. Send your blueprint for prompt quotation.

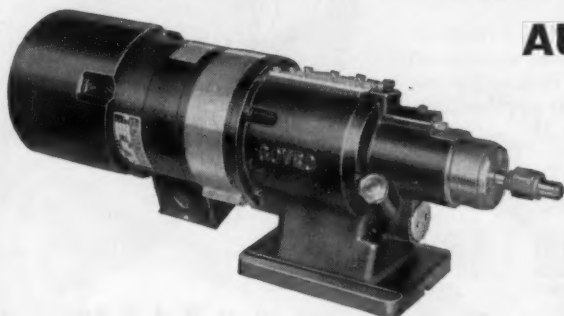
John Gillen Company

**Makers of: Taper Pins,
Machine Parts & Keys, Groove Pins**

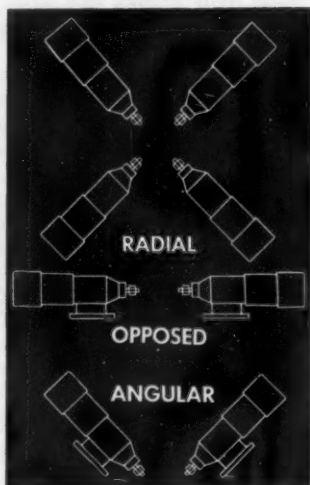
JOHN GILLEN COMPANY, INC.
2542 S. 50th Avenue
CICERO 50, ILLINOIS

For more data circle 394 on Reader Service Card

BUILD YOUR OWN



AUTOMATIC DRILLING OR TAPPING MACHINE



With Govro-Nelson Automatic Drilling and Tapping Units, together with the bases and electrical controls which we can supply, you can build yourself an automatic drilling or tapping machine at substantially lower cost than a special machine.

Any number of units may be employed. Examples of the various ways in which they may be arranged are shown at the left.

The Drilling Units are made in several sizes with spindle speeds from 1100 to 3450 RPM. Drill Units have full Hydraulic Control with external adjustment for the rapid approach, the rate of feed and the length of stroke. Suitable for drills up to $\frac{3}{8}$ ", depending on material.

The Tapping Units are available in two sizes with 550 and 1725 RPM spindle speed. Features include no clutch and no lead screw and automatic adjustment for various leads. Suitable for tapping 0-80 to $\frac{3}{8}$ -16, depending on material.

Write for Literature

GOVRO-NELSON CO.

Machinists of Precision Parts for 33 Years

**1933 Antoinette
Detroit 8, Mich.**

Automatic

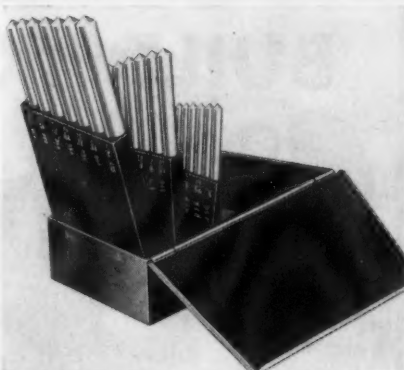
DRILLING UNIT

For more data circle 395 on Reader Service Card

new shop equipment . . .

COMPLETE LINE OF DRILL BLANKS

Whitman & Barnes, 40050 Plymouth Rd., Plymouth, Mich., has announced a complete line of drill blanks for use in all types of industrial applications. Intended primarily for the sizing of



Complete set of W & B Drill Blanks

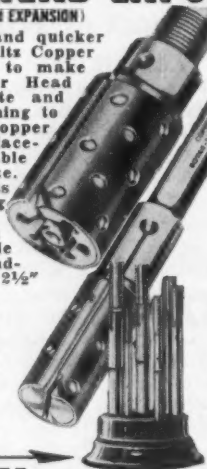
Boyar-Schultz COPPER HEAD LAPS

(STANDARD and EXPANSION)

It is less costly and quicker to use Boyar-Schultz Copper Head Laps, than to make your own. Copper Head Laps are accurate and rapid to use. Nothing to wear out but the copper sleeve which is replaceable and adjustable to the correct size. Adjustment permits maintaining lapping size till worn out and replaced with new ones. Available from stock in standard sizes, $\frac{1}{8}$ " to $2\frac{1}{2}$ " diameters.

SPECIAL TOOL MAKERS BENCH LAP SET

Consists of seven most commonly used sizes — $\frac{1}{8}$ " - $3/16$ "
 $\frac{1}{4}$ " - $5/16$ " - $3/8$ "
 $7/16$ " - $1/2$ ", with enameled die cast base.



BOYAR-SCHULTZ CORPORATION
2020 South 25th Ave., Dept. F-L, Broadview, Ill.

For more data circle 396 on Reader Service Card

holes, these drill blanks can also be used for punches, knock-out pins, gages, dowels, rollers, and so on, as well as for stock for arbors, mandrels, router bits and end mills. According to the company, the drill blanks provide a highly versatile, economical toolroom item.

W&B drill blanks are the same length as jobbers' drills, hardened and ground to a tolerance of plus or minus 0.0003. Precision blanks ground to a tolerance of plus 0.0002 to minus 0.0000 are also available at no extra cost. The drill blanks may be had in a complete range of fractional, letter and wire gauge sizes.

For more data circle 94 on Reader Service Card

For BIG Savings at LITTLE Cost!

Variable Speed Drive — Standard Equipment

MODEL L—The economy, hinge-type saw in our line 9" x 16" capacity. One-piece welded frame lowers hydraulically. Easy blade adjustment for proper cutting. Quick blade change from top of machine. Special precision guides for longer blade life. Floor space only 20" x 66".

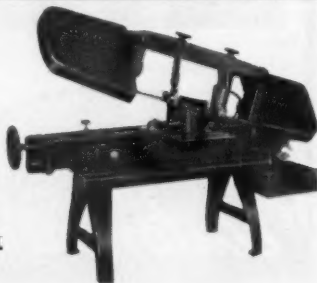
Send for FREE CATALOG.

Dept. M.

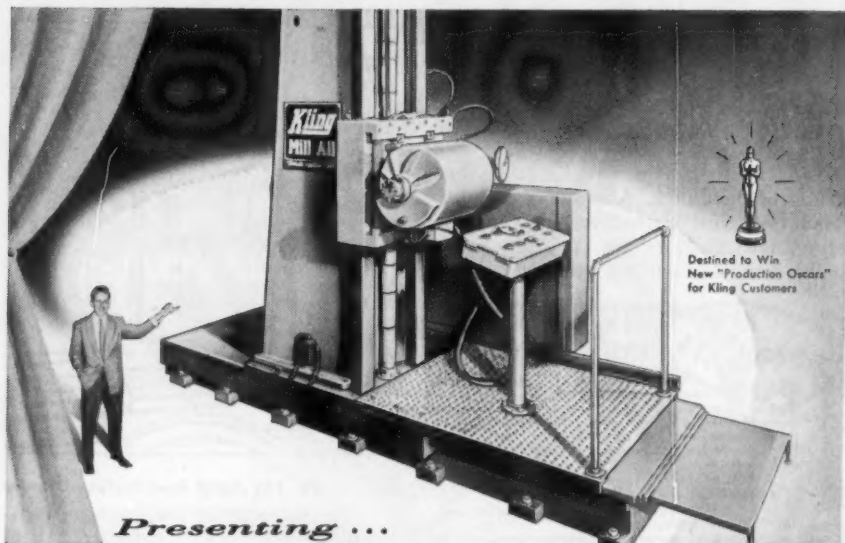
W. F. Wells and Sons
Metal Cutting Band Saws

THREE RIVERS
MICHIGAN

MODEL L



For more data circle 397 on Reader Service Card



Presenting ...

the New **Kling** MILL-ALL

...does more facing jobs faster and at lower cost!

This new high speed face milling machine offers exceptional power and capacity, is simply designed, easy to operate and enduringly built, as demonstrated by these construction details: Primary construction, welded steel; Vertical feed screw protected

by telescoping tubular brass covers; Non-metallic ways used on both horizontal and vertical ways; Telescoping steel covers used to protect horizontal ways; Motor mounted on slide which provides for 10 inches of in-and-out travel of cutter. Send for data.

1155MM

How this new machine Outperforms all others;

Some of its jobs	Feed Rates	Metal Removal Rate	Horiz. Cutter Travel	Vert. Cutter Travel	Motors
Faces structural steel beams and columns and other steel sections and fabrications.	(Horiz. and Vert.)	Up to 60 cu. in. per min.	4 sizes 72" to 144"	3 sizes 60" to 84"	3 H.P. Horiz. and Vert. Gear Head Feed Motors with Brake
Faces steel and iron castings, forgings, weldments, die blocks, etc.					40 H.P. Spindle Motor Direct Drive
Does plate edging; can chamfer plates and bars (tilting head model) and can be adapted to mill aluminum and other nonferrous metals.	40" and 80" per min.				75 H.P. also available

Since 1892

Active Kling Distributors cover practically every marketing area of U.S. and Canada. Write us for name of one nearest you.

Kling

BROS. ENGINEERING WORKS

1320 N. KOSTNER AVE. • CHICAGO 31, ILLINOIS

Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.

Export Distributor: Simmens Machine Tool Corp., 50 E. 42nd Street, New York 17, N. Y.

Makers of Friction Saws; Shears, Rotary, Double Angle and Guillotine; Punches, Universal Beam and Single End Type; Combination Shear, Punch and Copar; Rolls, Angle and Plate Bending; Bulldozers.

For more data circle 398 on Reader Service Card

June, 1956

modern machine shop 247

new shop equipment . . .

SURFACE GRINDER HAS 7 INCH GRINDING EQUIPMENT

In order to provide greater toolroom grinding flexibility, Abrasive Machine Tool Co., East Providence, R. I., has announced that its No. 1½ (10 x 15 inch) precision surface grinder is now

**CUT
TOOL
COSTS**

**broken tools
made like new again
with NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6) Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

**NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!
GUARANTEED STRONG AS NEW!**

Send them to us like this! We return them like this!

NU-TANGS INC. 1339 Bates Avenue
Cincinnati 25, Ohio

For more data circle 399 on Reader Service Card

NEW

General

**FLEXIBLE
POWER
STRAIGHTENING
PRESSES**

**WITH
AIR CONTROLLED CLUTCH**

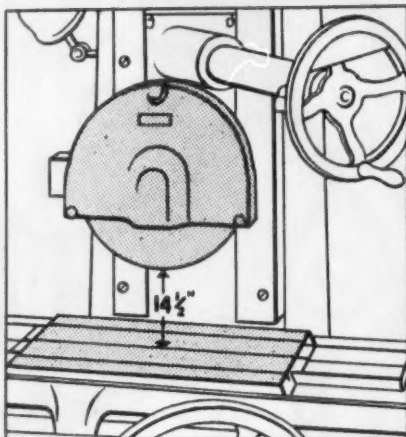
- SLASH TIME
- INCREASE PARTS PER HOUR
- MAKE MONEY

General Mfg. Co.
6433 FARNSWORTH
DETROIT 11, Mich.



For more data circle 400 on Reader Service Card

248 modern machine shop



Abrasive No. 1½ Hand Feed Surface Grinder

available with 7 inch grinding wheel equipment. The No. 1½ standard is equipped with a 12 inch wheel because of the economy of 37½ inch cutting periphery. The new 7 inch grinding wheel equipment gives a 22 inch periphery and a full 14½ inch of clearance between the wheel and the table for big job toolroom grinding.

For more data circle 95 on Reader Service Card

★ ★ ★

COMBINATION COIL CRADLE AND POWER DRIVEN STRAIGHTENER

U. S. Tool Co., Inc., Ampere (East Orange), N. J., has introduced a com-

CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

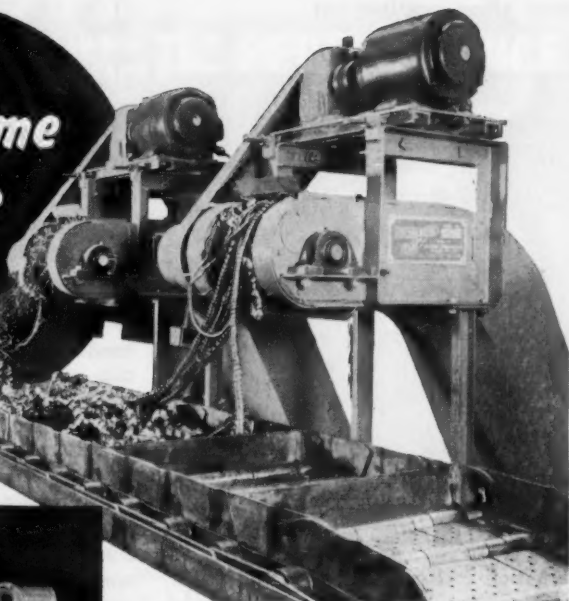
KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

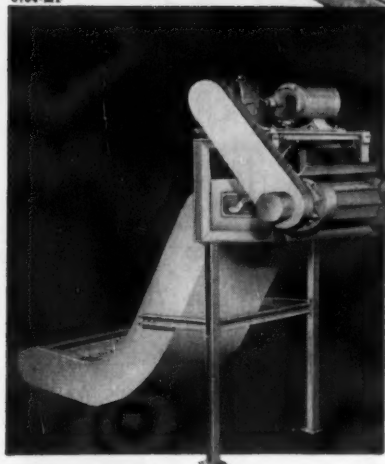
For more data circle 401 on Reader Service Card

June, 1956

**NO
Down Time
FOR SCRAP
REMOVAL**



6764-MF



The MAY-FRAN CHIP-TOTE is available in a wide range of sizes fabricated from standard components.

REMOVE CHIPS, TURNINGS AND BORINGS AUTOMATICALLY WITH THE MAY-FRAN CHIP TOTE®

You keep men and machine tools producing and avoid manual scrap handling when you install MAY-FRAN CHIP-TOTE automatic scrap conveyors.

CHIP-TOTES can be furnished for use on any standard multiple-spindle or automatic machine tool. Operating speed can be synchronized to specific job requirements.

By reducing clean-up time at the day's end and eliminating down time for scrap removal, MAY-FRAN CHIP-TOTES quickly pay for themselves. Be sure to obtain the complete story on the cost-saving CHIP-TOTE.

For complete information write for Catalog MF-640



MAY-FRAN
ENGINEERING, INC.

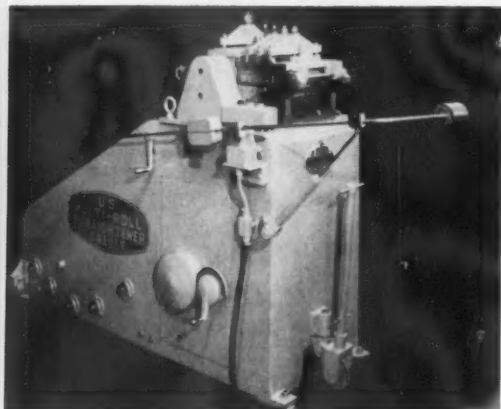
1708 Clarkstone Road
Cleveland 12, Ohio

For more data circle 402 on Reader Service Card

June, 1956

modern machine shop 249

new shop equipment . . .



View of U. S. Model PDSC-940 Combination Coil Cradle and Power Driven Straightener

bination coil cradle and power driven straightener, designated as the Model

PDSC-940. The unit is designed to handle material up to 9 inches wide and 0.025 to $\frac{1}{8}$ inch thick and accommodates coils with o. d. up to 40 inches and weighing up to 1,500 pounds.

The entire unit is mounted on casters for portability. The cradle has five coil rest rolls, mounted in self-aligning bearings. Inner side frames are crank adjustable to accommodate stock width. The straightener is equipped with six hardened and ground straightening rolls mounted in needle bearings (lower three power driven), plus a pair of hardened and ground power driven take-in rolls.

The straightener is of hinged construction to facilitate cleaning of rolls and starting a new coil. Indicators are provided on straightening rolls to simplify setting of rolls. Additional features include a mercury switch loop control mechanism and 2 h.p. variable speed drive.

For more data circle 96 on Reader Service Card

**For tough jobs
in the
toolroom . . .**

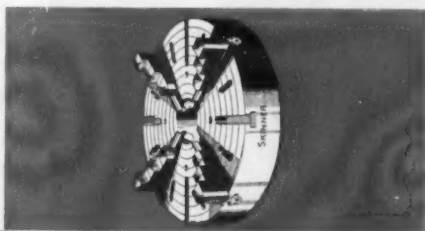
SKINNER
precision independent
CHUCKS



THE CREST OF QUALITY

THE **SKINNER**

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These accurate, powerful chucks are made in several models for medium and heavy-duty work. Their sizes range from $4\frac{1}{2}$ " to 36". All have semi-steel or steel bodies; all other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible tops for internal or external gripping. The body surrounds 60% of each operating screw, ensuring proper alignment, long life.

Write Skinner or your Skinner distributor for folder.

CHUCK COMPANY

210 Edgewood Ave., New Britain, Conn.

PROOF OF TAPMATIC PERFORMANCE

86% INCREASE IN PRODUCTION

WITH NO TAP BREAKAGE

HILL MACHINE COMPANY



1301 EDDY AVENUE

Rockford, Illinois

March 15, 1956

Tapmatic Corporation
845 West 16th Street
Costa Mesa, California

We believe you will be happy to learn of the excellent results we have had by using Tapmatic Tapping Attachments with our Hill Sensitive Radial Drill.

Our joint-armed drilling machine, with Tapmatic Tapping Attachments, has **reduced production time by 86%** in comparison with a conventional set-up on standard drill presses. In addition to reduced production time, by incorporating the Tapmatic Tapping Attachments, we were able to make a **substantial reduction in tool breakage**, especially with very small taps.

For our job **37,800 holes were tapped without breaking a tap**. Of this number, **12,240 were tapped No. 2-56, 1/2" deep**. The piece was a complex aluminum alloy aircraft part. A large number of the holes were bottom-drilled and tapped, the balance through holes.

We, therefore, consider the unusual performance of the Tapmatic Tapping Attachment to be a really radical step forward in producing sized, threaded holes with a minimum of effort and breakage and the maximum of efficiency and accuracy.

Yours truly,
HILL MACHINE COMPANY

Denzil J. Showers
Denzil J. Showers
Sales Manager

Send For Literature

TAPMATIC

CORPORATION

845 West 16th Street • Costa Mesa, California • Phone Liberty 8-3404

For more data circle 404 on Reader Service Card

new shop equipment . . .

TAPPING ATTACHMENT PERMITS HEAVY TAPPING ON SMALL DRILL PRESSES

A planetary gear arrangement which reduces tap speed to 1/3 the drill spindle speed gives the Ettco-Emrick No. 3-B Tapping Attachment, announced by Ettco Tool Co., Inc., 598 Johnson

Ave., Brooklyn 37, N. Y., the extra power needed to tap or thread large holes on small drill presses. The construction of the tapper features a sensitive steel clutch design and patented enclosed oil bath. The unit is oil filled and sealed at the factory. In operation, a fan on the steel clutch whips the oil into a fine mist, which is said to provide more efficient cooling and more effective lubrication.

The unit utilizes an Ettco-Emrick No. 3-E Visible Grip Balanced Tap Chuck, which can accommodate any standard tap or button die holder. Maximum tapping and threading capacity is 1/2 inch in steel.

Available with either a No. 1 or No. 2 taper shank or female adapter,

TAP-LOK INSERTS®

**... fortify against
"on-again, off-again" thread wear**

In this Millers Falls

Saber Saw there is no danger of thread failure, despite repeated removal and replacement of the knob in saw blade changes. A TAP-LOK INSERT provides a wear-resistant thread where the stud of the knob enters the aluminum housing.

TAP-LOK INSERTS are internally and externally threaded steel or brass bushings which increase thread strength in many structural materials. Their self-tapping feature reduces costs by eliminating separate tapping, hole preparation and secondary staking.

Widely used as original equipment the INSERTS are also ideal for repair of stripped threads.

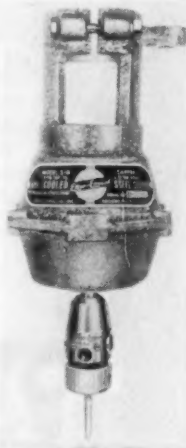
Send for new TAP-LOK Booklet.

Also manufacturers
of Groov-Pins
for positive locking
press fit.

GROOV-PIN
CORPORATION

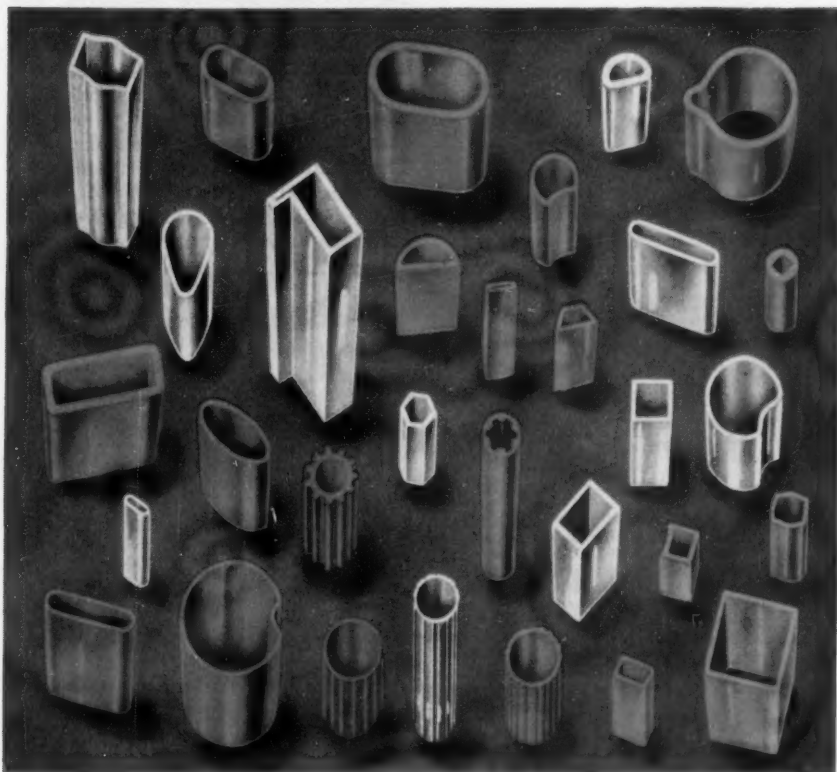
1135 Hendricks Causeway, Ridgefield, N. J.

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**Ettco-Emrick No. 3-B
Tapping Attachment**

A SHORT CUT TO A FINISHED PRODUCT



YOU NAME THE TUBE SHAPE AND THE METAL

Our specialized facilities and stock tools can save you time and money

Special-shape seamless tubes in straight lengths, or cut into short pieces, can save several steps in arriving at a finished product—can save you material and many direct labor costs. The American Brass Company's French Small Tube Division has turned out thousands of tubes in special shapes up to $\frac{3}{4}$ " O.D. A variety of stock tools is available to save fitting-up charges.

For consumer products: Some special tubes are produced to the accepted commercial tolerances and finishes for such applications as electric fixtures,

furniture ferrules, heat exchangers, radiator tubes, refrigeration controls, hardware, jewelry, automatic pencils, and a host of others.

High precision products: Many are made unusually accurate in I.D. and O.D. dimensions, with specially cleaned inside and outside surfaces, for parts for control instruments and for other scientific and industrial equipment.

Wide choice of metals: Special-shape tubes are available in copper, brass, bronze, nickel silver, special copper alloys, and aluminum—furnished in

straight mill lengths or accurately cut to your specifications.

For action: See your American Brass Company representative or send in a sample, drawing, or description, together with the quantity you need, the metal, and other pertinent data. Address: The American Brass Company, French Small Tube Division, Waterbury 20, Conn.

5046

ANACONDA[®]
SPECIAL-SHAPE TUBES

For more data circle 406 on Reader Service Card

new shop equipment . . .

the 3-B taper can be readily fitted to practically any type of drill press.

For more data circle 97 on Reader Service Card

★ ★ ★

BENCH BIN FRAMES

Bathey Manufacturing Co., 100 S. Mill St., Plymouth, Mich., recently in-

troduced four new bench frames for use with its removable bin boxes. The bin boxes come in five sizes from $1\frac{3}{4}$ x 6 x $2\frac{3}{4}$ inches deep to $11\frac{1}{8}$ x 6 x $2\frac{3}{4}$ inches deep. The current models, made in two width frames with three rails, were intended for assembly use and gave working space between bin boxes. The additions include two wide units and two narrow units with four rails and five rails, respectively. These units, with the same overall cubic require-

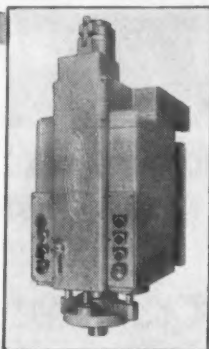
ments as the three rail units, are intended for permanent or semi-permanent storage on the work bench. They achieve additional storage capacity with no increase in space requirements.

The wide units are 28 inches wide x 23 inches high x 8 inches deep and the narrow units are 13 $\frac{1}{2}$ inches wide x 23 inches high x 8 inches deep.

For more data circle 98 on Reader Service Card

the all new VERTICAL or HORIZONTAL 101 taper

A brand new . . . Kaufman Tapper with more new operating, control, and production features . . . than has ever before been incorporated into a single tapping head. You can mount it vertically or horizontally . . . arrange it in combinations to do two or more operations . . . or mount it horizontal or angular in combination with vertical heads to do various operations simultaneously. Additional revolutionary features include:



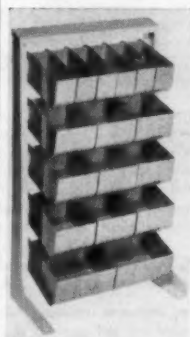
- An extremely sensitive torque control . . . which signals overload, stops the machine automatically to avoid tap breakage.
- A pressure lubricated lead screw.
- Positive precision depth control.
- Air operated clutch with instant reversal.
- A simple non-reversing motor drive.
- Spindle speeds ranging from 35 to 785 RPM.

These and many additional features are incorporated into the new 101 Series Kaufman Tapper. For more complete information about this and other Kaufman Tappers, write

KAUFMAN MFG. CO.

551 S. 29th Street Manitowoc, Wisconsin

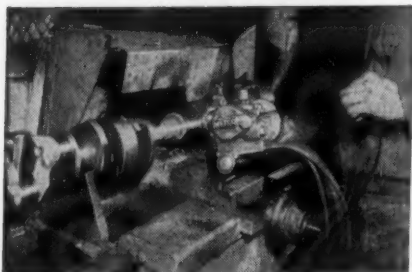
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Bathey Bench Frame
for Bin Boxes

KAUFMAN

when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.



Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.



Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO

in Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. **You haven't just salvaged a part—you've improved it.**

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1111 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me Bulletin 57-C.

☐ Please have Metco Field Engineer call.

Name

Company

Street

City Zone State

For more data circle 408 on Reader Service Card

new shop equipment . . .

HOLDING FIXTURE FOR ODD AND IRREGULAR PARTS

The Polyp Universal Clamp, introduced by Firearms International Corp., Washington 22, D. C., is a practical clamp and holding device for unusual, unsymmetrical parts and can be used

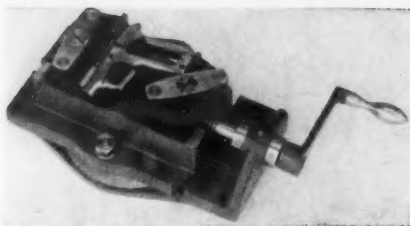


Illustration showing Polyp Universal Clamp



Specializing in Stainless Steel
Standard and Made to Order Precision Parts
Send Your Blueprints for Prompt Quotations

PEASLEE METAL PRODUCTS CO.
470 Tolland St.
EAST HARTFORD, CONN.

For more data circle 409 on Reader Service Card

on the table or faceplate of practically any machine tool for accurate machining. For experimental work, for design development on new products and for improvement on existing patterns, a Polyp Clamp saves time and is the answer to many common problems of production. It also can be used for the repair shop in the replacement of broken parts or duplication of original parts; for the toolroom in the fabrication of jigs and fixtures; and for the machine shop as a holding jig of unlimited applications. Furthermore, it can be used as a drill press or milling machine vise; as a holding device on the faceplate of a lathe; as a holding device for the assembly line; for the gunsmith in a number of applications; and as a simple but effective "no-go" gage. A revolving base plate, graduated in degrees, is available.

The Polyp Universal Clamp grips and holds at once. It is self-contained to accommodate the most unusual



Patented

WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

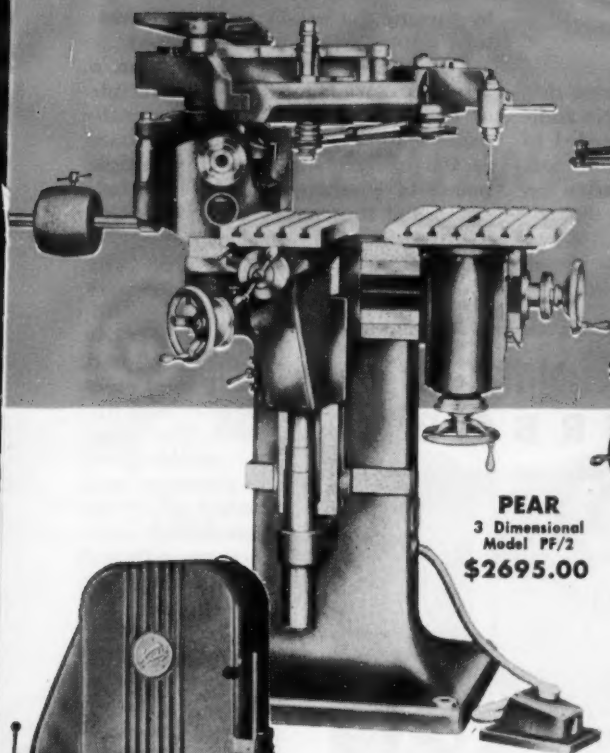
Write for Price and Folder.
Representatives Wanted.

JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.



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OUTSTANDING VALUES!



PEAR
3 Dimensional
Model PF/2
\$2695.00

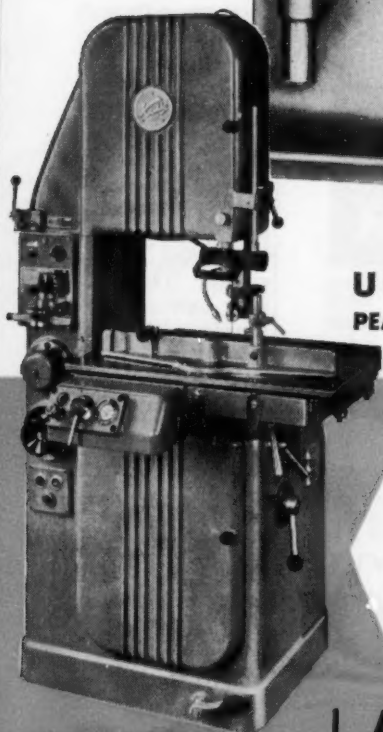


PEAR
2 Dimensional
Model CG/3
\$1495.00

UNUSUAL HIGH PRECISION

PEAR 3 and 2 dimensional Pantograph Engraver

many special accessories available



CONTOUR CUTTING MACHINE

KOLLE MODEL K-16 VERTICAL METAL CUTTING BANDSAW

with infinitely variable cutting speeds from 33 to 2400 ft. per minute. For sawing, filing, polishing.

THE TABLE SWIVELS 15 DEGREES ON ALL FOUR SIDES!

\$1695.00

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AARON MACHINERY CO. Inc

Dept. M, 45 Crosby St., N.Y. 12, N.Y. • Walker 5-830

new shop equipment . . .

shaped or delicate parts without distortion or damage to the part. No additional blocks or gadgets are needed to insure rigid clamping. The clamp permits normal machining operation on modern machine tools without dislocation of the original true setting. Clamping is done as in a regular bench vise,

by turning the handle until the necessary gripping pressure is obtained.

The Polyp Clamp is more than a bench vise; it operates on the principle of four points, each of which establishes a force perpendicular or square to the contact surface. The multiple points of pressure are statically balanced and thus interact in pairs. This feature of the universal clamp is unique and is mechanically correct. The

holding forces are equally distributed along the length of the part and in most cases diametrically opposed. The possible combinations of pressures and contact points are considerable and they are different for each clamping operation.

The Polyp Clamp has two sliding bodies which are moved towards one another by means of the counter-threaded screw spindle. The sliding bodies are dovetailed to the base which is accurately machined and scraped in the ways. Each sliding body contains a center pin. The jaw link swivels about this pin which serves as a fulcrum. This link, acting as a lever, contains the swivel connected steel jaws.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

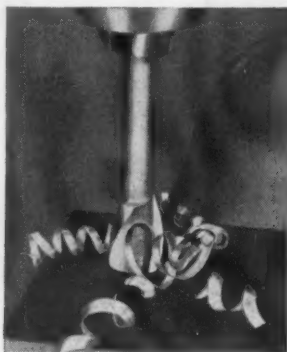
WELDON "TU-LIP" COUNTERBORES

**For FAST, FREE
CUTTING**



As the name implies, WELDON "Tu-Lip" counterbores have only two cutting lips or flutes. This feature, together with the fast spiral, makes the "Tu-Lip" the fastest, freest cutting counterbore on the market.

Breakage due to clogging is prevented because this improved cutting tool provides more than ample chip room. Furnished singly in sizes desired or in convenient wood block sets as illustrated.



*Weldon distributors throughout U.S.A. and Canada
carry complete stocks to serve you.*

WRITE FOR LATEST CATALOG NO. 10.

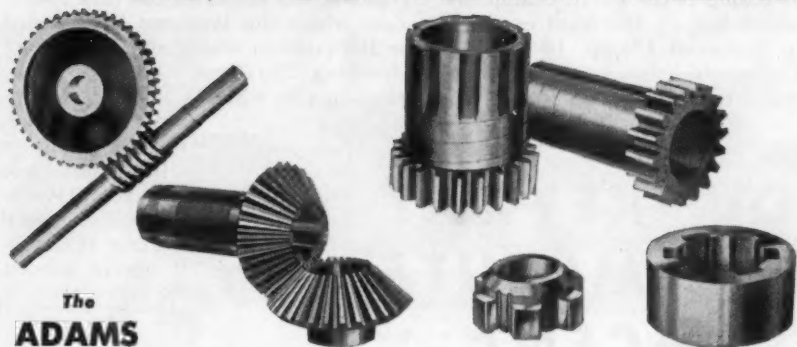
THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

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AS YOU WANT THEM!



**The
ADAMS
Line
Includes:**

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HELICAL GEARS
BEVEL AND MITER
GEARS
WORMS AND WORM
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SPROCKETS
INTERNAL GEARS
(Spur and Helical)
RATCHETS
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RACKS
LEAD AND FEED
SCREWS
SHAVED TOOTH
GEARS (Spur and
Helical)
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WORMS

Adams Gears are custom made exactly to your specifications. The combination of skilled workmanship, precision equipment, and quality control give you assurance of outstanding quality. This, in turn, assures the dependable performance of your product. The Adams Company, 1942 Cypress Street, Dubuque, Iowa.

The ADAMS Company
Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

**FINE GEARS MADE TO
YOUR SPECIFICATIONS**

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new shop equipment . . .

The face of each jaw is smooth and carefully machined and polished for parallel alignment.

A slight variation of the Polyp Universal Clamp is the Polyp Clampmaster which has all the features of the Polyp Universal Clamp. In addition, the Clampmaster has a locking feature through which means the jaws of the

clamp can be locked in any predetermined position. The Polyp Universal Clamp has cylindrical pins which allow the jaws to swivel freely. The clampmaster jaws can be locked in any position by means of a conical pin and Allen head lock screws. The universal clamp is best suited for one time operation, where the jaws can be swiveled to the position which affords the best clamping. The Clampmaster is best applied to jobs where a number of dupli-

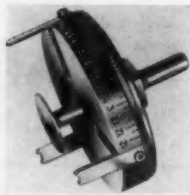
cate pieces are to be clamped in a like manner and specifically in jobs where special holding fixtures would be needed.

For more data circle 99 on Reader Service Card

★ ★ ★

HOLE CUTTER

Erwood, Inc., 1770 W. Berteau Ave., Chicago 13, Ill., has announced a new, adjustable hole cutter that will cut holes of various sizes in steel, brass, plastic, wood and other materials. The holes can be from 2¼ to 5 inches in diame-



Erwood Hole Cutter

1—KEYWAY —MINUTE —CENT

Number one time and money saver — that's the Minute Man Keyway Broach Kit. With it you can cut a keyway in just one minute for as little as one cent. For keyways from 1/16" to 1" in any bore from 1/4" to 3".



Minute Man Broaches for square and hexagonal holes and Production Type Keyway Broaches are available from stock from your Industrial Distributor.

The duMONT CORPORATION, Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name.....

Company.....

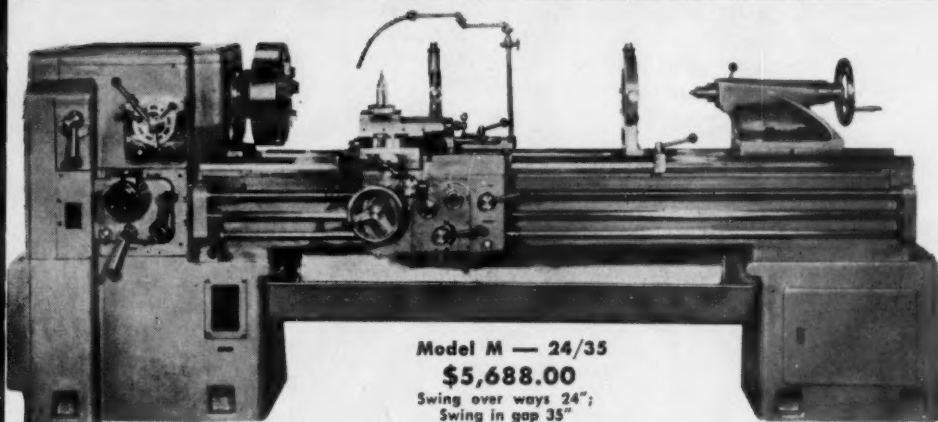
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IMPERIAL LATHES

FLAME HARDENED AND GROUND BED WAYS

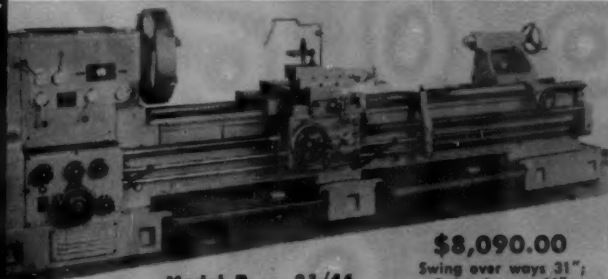
Precision spindles are hardened and ground, machined from chrome-nickel steel forgings. All gears and shafts are hardened and ground. Spindle noses are standard taper key-drive type.



Model M — 24/35

\$5,688.00

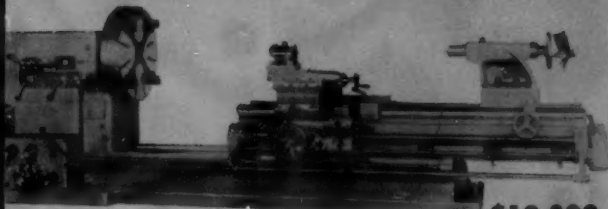
Swing over ways 24";
Swing in gap 35"



Model P — 31/46

\$8,090.00

Swing over ways 31";
Swing in gap 46"



Model PS — 34/61

\$10,390.

Swing over ways 34";
Swing in gap 61"

"M" Series—"Pre-Selector" **Production Lathes**

19", 21" and 24" swing,
up to 230" centers

"P" Series—Heavy Duty Geared **Head Engine Lathes**

31", 34", 38" and 42" swing,
up to 316" centers

"PF" Series—Super Productive **Heavy Duty Lathes**

45", 51" and 67" swing,
large center distances.

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new shop equipment . . .

ter. You dial to the size desired. The cutter blades are specially designed and heat treated. This dial hole cutter has many other uses besides hole cutting and is an ideal tool for use in almost every industrial plant. Smaller models are available for home workshops and model builders.

For more data circle 100 on Reader Service Card

ADJUSTABLE SPACING COLLAR

Fast, accurate spacing of multiple set-ups on production milling machines and similar equipment is made easy by a micrometer adjustable spacing collar, introduced by Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn. Made from a new hardened alloy steel that doubles holding capacity and increases service life, the Milling "Mike" is calibrated in thousandths of an inch. Positive adjustments to split

thousandths can be made visually. Plus or minus markings show the operator which direction to adjust. Adjustments to 0.001 are said to be easily made on the cutter arbor nut with a handy spanner wrench furnished. The adjustable spacing collar is available in six cutter arbor sizes: $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2 inch.

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NOW

FROM THIS CATALOG



NEW CARBIDE TOOLING PRECISION- MADE

Golden-Circle Rotary Tools

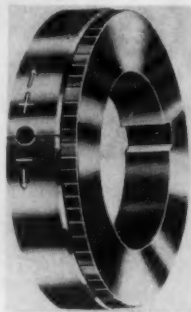
New! Elgin's expanded line of burs and rotary files, plus solid carbide end mills, all shapes and sizes precision-made. See how they can meet your requirements at lower cost! Write for your FREE copy of the new "Golden Circle" booklet today!

ABRASIVE DIVISION, DEPT. (P)

ELGIN NATIONAL WATCH COMPANY

Elgin, Illinois

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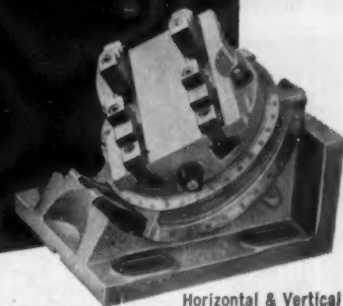
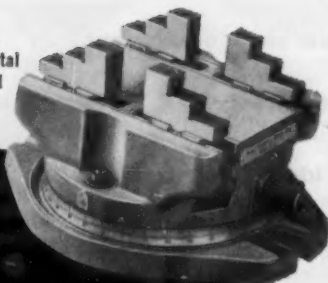


Dayton Rogers
Micrometer Adjustable
Spacing Collar

MULTI-PURPOSE WONDER GRIP VISES

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

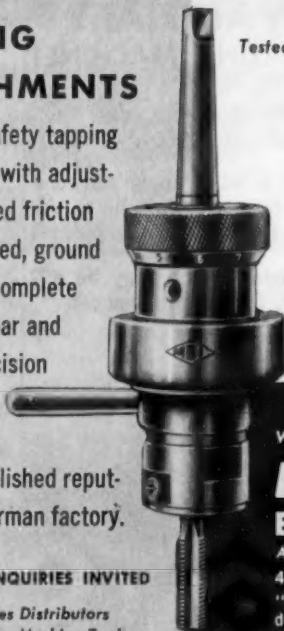
Horizontal
Swivel
Type



Horizontal & Vertical
Swivel Type

TAPPING ATTACHMENTS

Reversible safety tapping attachments with adjustable graduated friction drive, hardened, ground and lapped, complete with torque bar and handles. Precision made throughout by long established reputable West German factory.



Tested for Performance to High Amer. Standards
Immediate Delivery from N.Y. Stock

MADE IN GERMANY

Low Competitive Prices

- Quick Change Chucks and Collets
- Wille-Grip Keyless Drill Chucks
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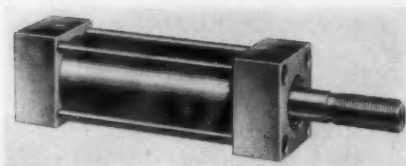
Also United States Distributors
of European Machine Tools

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new shop equipment . . .

DOUBLE ACTING CYLINDER HAS SEAMLESS STEEL BARREL

Identified as the Model "D," a double acting cylinder featuring a hard chrome plated seamless steel barrel which is roller burnished to a fine micro-inch finish, has been placed on the market by Alkon Products Corp.,



Alkon Model "D" Double Acting Cylinder

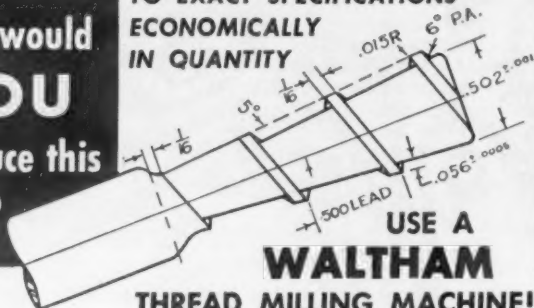
200 Central Ave., Hawthorne, N. J. The cylinder heads are machined to

close tolerances from high tensile aluminum extruded bar stock.

Additional construction features include a hardened, ground and polished stainless steel piston rod; large surface piston and heavy steel thrust ring to absorb shock forces; self-adjusting piston packings; nylon piston bearing; extra large Oilite cartridge type piston rod bearing; self-adjusting piston rod packings; piston rod wiper; stainless steel tie rods; unique cushion arrangement which assures positive cushioning with immediate acceleration on the return stroke; and exclusive cushion design that permits the use of extra long adjustable cushions up to

How would
YOU
produce this
part?

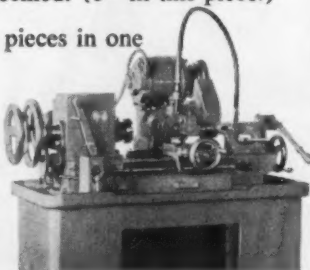
TO EXACT SPECIFICATIONS
ECONOMICALLY
IN QUANTITY



Because
it has . . .

1. Ability to gear for fast leads combined with high helix angle. (15° helix angle on this part.)
2. A cutter head designed so that a base angle may be swiveled so as to place the axis of the cutter spindle at the required angle to the axis of the work piece (5° in this piece).
3. Is equipped with a taper attachment which may be adjusted to produce the taper specified. (5° in this piece.)
4. Will produce finished work pieces in one pass of the cutter.
5. Maintains long-lived accuracy with a minimum of costly repairs and maintenance.

Brochure #248 gives full information — we'll be glad to send your copy.



WALTHAM

MACHINE WORKS, INC.

Box 48, Waltham, Mass.

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REDUCE Set-up Time and the need for expensive jigs & fixtures

HART MILLING FIXTURES

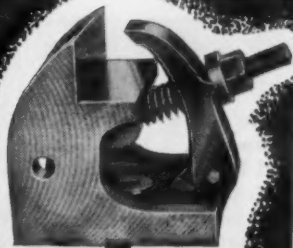
"Masters of A Thousand Set-ups"

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illustrated
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Value proved by years of use.

WALTER W. FIELD & SON, INC.

39 Hayward St., Cambridge 42, Mass.



For more data circle 419 on Reader Service Card



DYKEM STEEL BLUE

Stops Losses

making Dies and
Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

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THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

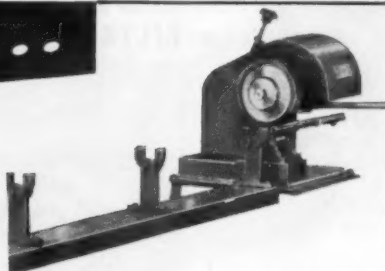
With DYKEM Steel Blue Without DYKEM Steel Blue

For more data circle 420 on Reader Service Card

ZIP... ZIP...

CUTS TUBES FAST

It zips right through tubes from $\frac{3}{8}$ " to $1\frac{1}{4}$ " O.D., from light gauge to 16-gauge wall thicknesses. Cuts up to 2,000 pieces an hour, effortlessly, with just a stroke of the handle. Convenient, adjustable table with 5 Dual-Roller Forks. Also available, Cut-Off Machines for pipes and tubes up to 12" diameter, air or hand-operated.



and we'll prove it!

Simply send us a sample of your tubes, we'll show you how clean and fast a Continental Rotary No. 1 Cut-Off Machine cuts, and return the pieces for your inspection along with actual time studies.

**REQUEST YOUR
CONTINENTAL
CATALOG TODAY**

Continental **MACHINE CO.**

SINCE 1919

1952 N. MAUD AVE. • CHICAGO 14, ILL.

For more data circle 421 on Reader Service Card

new shop equipment . . .

6 inches for variable feed control. The cylinder can be furnished with standard three-way flush rabbet mountings, if desired. Large unrestricted ports allow for maximum flow with minimum friction. Ports can be rotated to any 90 degree position in relation to each other and to the mount.

For more data circle 102 on Reader Service Card

THREAD MEASURING WIRES ARE CALIBRATED

The Van Keuren Co., 175 Waltham St., Watertown, Mass., has announced that all of its thread measuring wires for standard 60 degree Unified and American Threads will be calibrated, in addition to being furnished within 0.00002 inch of nominal best size. The individual calibration of each set of wires is said to permit the more exact

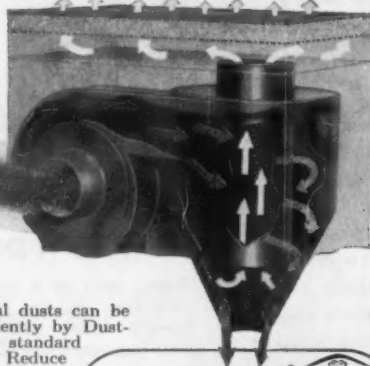
computation of the wire constant which is printed on the particular label accompanying the wires.

The principle advantage of this much needed refinement, according to the manufacturer, is that in many cases considerably more accurate pitch diameter measurements will readily result.

For more data circle 103 on Reader Service Card

CYCLONE SEPARATION

**FOR MORE EFFICIENT
DUST COLLECTION
—FILTERS LAST LONGER**



Almost all industrial dusts can be collected more efficiently by Dustkop. Thirty-seven standard models ready to use! Reduce installation costs—save space. Write for descriptive literature.

**ALSO A COMPLETE LINE
OF MIST COLLECTORS**

**DUSTKOP
STOPS DUST**



AGET MANUFACTURING COMPANY
1390 EAST CHURCH ST., ADRIAN, MICH.

For more data circle 422 on Reader Service Card

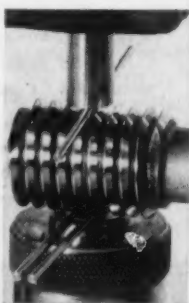
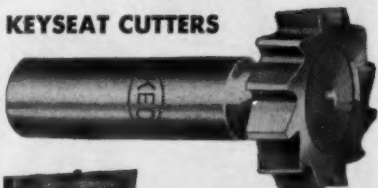


Illustration showing
three wire method of
accurately measuring
a thread gage

KEO

KEYSEAT CUTTERS



High speed. Right hand $\frac{1}{2}$ " shank. Diameter from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Standard sizes in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.

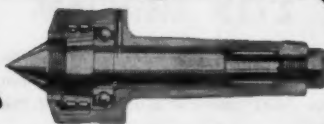
WRITE, WIRE OR PHONE
Jobbers' inquiries invited

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

For more data circle 423 on Reader Service Card

NIELSEN Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog
M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

For more data circle 424 on Reader Service Card
June, 1956

LIVE CENTER ACTION WITH DEAD CENTER ACCURACY

USE



ANTI-SCORING LUBRICANTS



PROVE IT TO YOURSELF IN YOUR OWN PLANT FOR ONE DOLLAR AND THIS COUPON!

Free-running on dead centers—with COMPLETE protection. CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It all adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

TRIAL ORDER— TWO FOUR OZ. TUBES \$1.00

Send me my order of CMD right away!
Bill me ☐ Bill my company ☐

Name _____

Company Name _____

Address _____

City _____ State _____

Chicago Manufacturing and Distributing Co.
1910 West 46th St., Chicago 9, Illinois

**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**

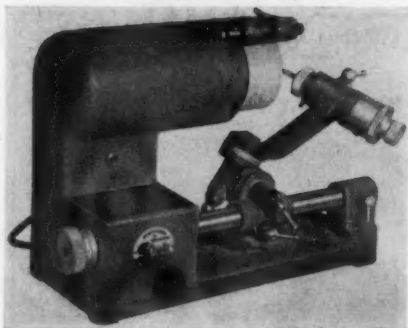
For more data circle 425 on Reader Service Card
modern machine shop 267

new shop equipment . . .

ACCESSORY INCREASES ENGRAVING MACHINE EFFICIENCY

Scripta, Paris, France, has announced a completely automatic accessory to eliminate the need of "sending out" (or tediously hand-sharpening) the cutting tools of engraving machines, when these lose their fine milling edge. The Scripta AL-3 Sharpening Machine is said to quickly renew the life of engraving cutters and require no special skill or training to operate.

Engraving cutters come in a wide variety of shapes, requiring highly accurate angles and perfect centering. The AL-3 not only restores blunted tools, but produces a complete range of original contours from uncut milling tool stock. While adaptable to any equipment, the AL-3 is designed to



View of Scripta AL-3 Sharpening Machine

sharpen cutters used in Scripta engraving machines, without the need to remove these from their chuck-mounting. In addition to speeding up the work of sharpening, this feature avoids the need to readjust the engraving machine before resuming engraving.

For more data circle 104 on Reader Service Card



Solve **YOUR** *Problems!* **SET-UP**

Making set-ups for tapping and reaming need not be a difficult job if you think ahead and provide yourself with the right type of tool holder—the Ziegler Floating Holder.

Why? Because with the Ziegler you do not have to make the set-up to the highest degree of accuracy that is humanly possible. Just come within 1/32" of accuracy on the radius, or 1/16" on the diameter, and the Ziegler holder does the rest.

Change over to this modern method of making tapping and reaming set-ups and see how it will solve the problems that you have had in the past.

PROMPT DELIVERY

Ziegler
ROLLER
DRIVE

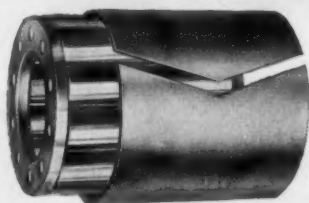
FLOATING HOLDER
for Taps and Reamers...

W. M. ZIEGLER TOOL CO.

13566 AUBURN
DETROIT 23, MICH.

• **WRITE FOR
CATALOG** •

For more data circle 426 on Reader Service Card



TYPE GC

INDUSTRIAL ROLLER BEARING

STANDARD SIZES ARE SHOWN IN OUR
GENERAL CATALOG SENT UPON REQUEST.

SPECIAL SIZES TO ORDER.

ANY QUANTITY, "ONE BEARING OR MANY"

THE GWILLIAM COMPANY

Incorporated 1912

358 FURMAN ST.

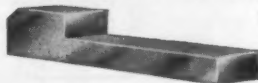
BROOKLYN 1, N. Y.

For more data circle 427 on Reader Service Card



MARK OF QUALITY

STANDARD MACHINE KEYS



We are able to furnish the following types of finished machine keys of any size and taper: Gib head taper keys, Plain taper keys, Straight keys, Round end feather keys, and Tilt keys. We can supply you quickly with the quantities you need at the specifications you require.

Send for new catalog giving complete information on Woodruff keys, taper pins, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS

PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 428 on Reader Service Card

June, 1956

Great
Buys
For

VICTOR'S 25TH ANNIVERSARY YEAR



Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate
Delivery From Stock!

VICTOR

MACHINERY EXCHANGE, INC.

Dealers in Tool Room Equipment

Dept. B, 251 Centre St.

Tel.: Canal 6-5575, New York 13, N. Y.

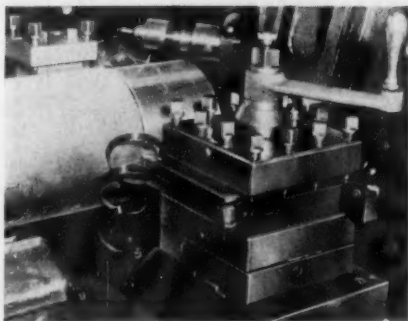
For more data circle 429 on Reader Service Card

modern machine shop 269

new shop equipment . . .

CERAMIC CUTTING TOOL MATERIAL

A new ceramic product has been introduced to the market by Sintox Corp. of America, Allentown, Pa. The manufacturer claims that the material, known as Sintox, is an economical, ex-



Sintox Ceramic Cutting Tool Material in use

pendable item with a base of non-strategic aluminum oxide which is available in unlimited quantity.

Sintox is used primarily in connection with a mechanical holder to minimize the time of a tool change. The same tool can be used for a heavy cut down to a quarter thousandths of an inch at a wide range of feeds and speeds.

Other uses of Sintox, such as milling cutters, boring tools and drills are in the process of development, as are certain uses in the electrical and textile industries.

For more data circle 105 on Reader Service Card

★ ★ ★

WET DRILL POINTER

The Model No. 510 semi-automatic wet drill pointer, introduced by Oliver

Over 85% of the torque wrenches used in industry are

STURTEVANT

TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities


in inch grams
...inch ounces
...inch pounds
...foot pounds

Every manufacturer, design and production man should have this valuable data. Sent upon request.


P.A. STURTEVANT CO.
ADDISON QUALITY 111 INDVS.

For more data circle 430 on Reader Service Card

HYDRAULIC



Hand Wheel Pump
5" and 8" diam.
for Machines and
Machine Tools.
Also custom made
to fit the job.



4 - Way Solenoid
Valve, Pilot and
Master. Use direct
up to 3 g.p.m. all
over this use with
Master Valve.

GOODRICH HYDRAULICS Holt, Michigan

For more data circle 431 on Reader Service Card

The STEVENS Line SINCE 1925

Introducing NEW series



15" ROTARY
TABLE—STD.

ROTARY TABLES, 5-7½-8-12-15-18-24"
sizes both standard and dial indexing types
ADJUSTABLE TILTING TABLES, #0-1-2
COMPOUND TABLES, #1-2
ROTARY-COMPOUND TABLES, #1-1½-2
INDEX CENTERS—multiple spindle
SPECIAL MACHINES—designed and built

See your dealer or write for bulletins

The John B. Stevens Company

Main Street, Somersville, Conn., U. S. A.

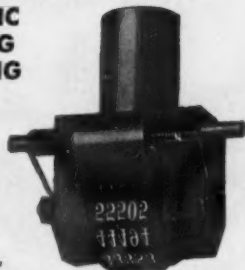
For more data circle 432 on Reader Service Card

NUMBERALL

Model
No. 50

AUTOMATIC INDENTING NUMBERING HEAD

Automatic
indenting
numbering
head for
consecutive
or repeat
numbering. ⅓"



up to ⅜" high figures can be furnished in
sharp face Gothic or shaded Roman fig-
ures. Can be used in foot or power presses.
Numbers: radio, airplane, tool parts, name
plates, and other objects in brass, steel,
fiber, plastics. Heads are of sturdy con-
struction and give uninterrupted marking
service. Catalog MS-50 on request.

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle 433 on Reader Service Card



A NECESSITY For Every Shop

BINOCULAR MICROSCOPE

WITH STEREOSCOPIC
3-DIMENSIONAL
VISION



The study of three
dimensional objects
requires stereoscopic vision, large
depth of focus, high resolution of
fine details, as well as large size of field.
These fundamental features are all com-
bined in the Binocular Microscope. The ob-
ject is seen right side up in both directions.

SOME OF THE MANY USES

Balls and ball races for pits and flats, edges
of razor blades and surgical knives, radio tube
parts, watchparts, jewels; tools of all kinds;
and control of surface finish in grinding and
lapping operations.

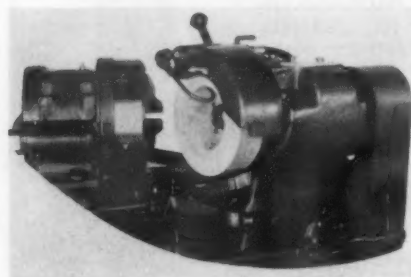
WRITE FOR
ILLUSTRATED FOLDER

Geo. SCHERR OPTICAL TOOLS, Inc.

200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.

For more data circle 434 on Reader Service Card

new shop equipment . . .



Oliver Model No. 510 Wet Drill Pointer

Instrument Co., 1430 E. Maumee St., Adrian, Mich., is available with two alternative methods of supplying the coolant to the tool area being ground. The standard wet type drill pointing machine is equipped so that the coolant is discharged directly on the sur-

face of the drill point and the adjacent area of the grinding wheel. This has been a common method used by industry, especially in grinding large diameter high-speed and carbon steel drills.

The first alternative method now available is the substitution of "water through the wheel." In this particular instance it is necessary for the user to purchase a grinding wheel with the outside diameter sealed. The sealing of the outside diameter of the grinding wheel precludes the misdirection of the coolant, due to centrifugal force. Since the grinding wheel employed is of a cup-type with steel backing, the only egress for the coolant is in the direction of the tool being ground.

The second alternative method available to the user is a combination of the two units described above. This set-up permits a flow of coolant both on the surface of the grinding wheel and the tool being ground, as well as "through



FREE—New Bulletin T-1 shows, describes
VAILL tube end forming machine
VERSATILITY for . . .

Beading • Flaring • Flanging
Sinking • Expanding • Grooving
Threading • Reducing
• Double Lap Flaring
• Double Lap Flanging
on Tubing up to 6" Diam.



THE VAILL ENGINEERING CO. 133 E. MAIN STREET WATERBURY 20, CONN.

For more data circle 435 on Reader Service Card

LESS DOWN TIME

means...

**INCREASED
PRODUCTION
GREATER
EFFICIENCY**

LOWER COSTS

SAVAGE TYPE "S" CUTTING TOOLS AND DIES, made of high-carbon, high-cobalt, special high-speed steel, are designed...

- FOR LONG LIFE
- TO SHRINK YOUR COSTS
- TO INCREASE YOUR PRODUCTION

PATENTED SAVAGE TOOL-HOLDER permits repeated sharpening with easy tool-length adjustment.

"SAVAGE NIBBLING MACHINES NIBBLE YOUR COSTS"

Quotation on Request

W. J. SAVAGE CO.

NIBBLING MACHINE PIONEERS
Knoxville Since 1885 Tennessee



For more data circle 436 on Reader Service Card

THE TWO IN ONE

**COMBINATION
ROTARY TABLE
AND
ANGLE PLATE**

**PRECISION
ACCURACY**

WORM adjustable from 0 to 90 degrees.

VERNIER control to within

WRITE FOR FOLDER 2 seconds of Arc.

Makers of Helical Gear Speed Reducers. Worm and Gear Speed Reducers. Standard and Special Gears. Wedge-Lock Turret for Lathes and Turret Lathes.

Open territory available to representatives

OLSON INDUSTRIAL PRODUCTS, INC.

40 W. WATER ST. WAKEFIELD, MASS.

For more data circle 437 on Reader Service Card

June, 1956

**HIGHER SPEEDS!
FASTER GRINDING!**

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$42⁰⁰

IN U.S.A.



Weight 12 ounces;
length 6 3/4 inches;
chuck size 1/4 inch.
Wheel guard removed
for better illustration.

The RPM's stay up while grinding... not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U. S. A.

For more data circle 438 on Reader Service Card

modern machine shop 273

Screw Machine Attachment Eliminates Secondary Marking Operations

Automatic die marking of part numbers, patent numbers, trade marks, etc., during the operating cycle of automatic and hand operated screw machines, bench and turret lathes, etc., on almost any surface of a part is possible with the complete line of automatic roll markers available from New Method Steel Stamps, Inc., 147 Joseph Campau, Detroit 7, Michigan.

Suitable for both light and heavy work, the markers are practically foolproof and eliminate the need for separate setups for marking, thus reducing cost, scrap, etc. Quick interchangeable roll dies give remarkable versatility and reduce time for setup changeover.



Model 500-C for automatically marking on outside cylindrical surface of screw machine parts, manufactured by New Method Steel Stamps.

New Method marking units are being used in leading screw machine shops throughout the country to mark millions of parts annually at costs of a fraction of a cent per part.

Illustrated is one of the three basic models of the cost cutting markers. Model 700 (not shown) is for marking and cutting off at the same time. The marker occupies the cutoff slide, leaving other stations open for machining operations. New Method also manufactures a complete line of hand stamps, inspectors' stamps, embossing dies, marking hammers, type and type holders, etc. Precision marking and engraving services available.

For complete information and descriptive bulletin, write New Method Steel Stamps, Inc., 147 Joseph Campau, Detroit 7, Michigan.

For more data circle 439 on Reader Service Card

new shop equipment . . .

the wheel." The use of water through the wheel further assures the user of a cool grind.

For more data circle 106 on Reader Service Card

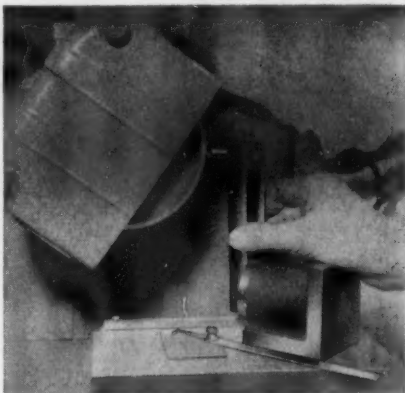
★ ★ ★

PLAIN ANGLE WHEEL DRESSER DRESSES ANGLES IN SECONDS

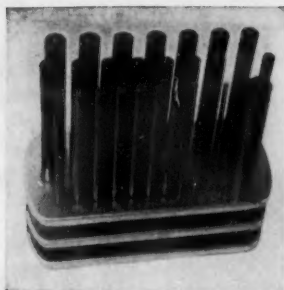
A plain angle wheel dresser, designated as the Angle Master, has been announced by J & S Tool Co., Inc., 871 Dorsa Ave., Livingston, N. J. The manufacturer claims that this unit combines precision accuracy together with durability for applications requiring low cost units.

This sturdily designed plain angle wheel dresser is 100 per cent dust-proof. All dresser parts are precision ground. Sealed ball bearings are used to provide a rugged and dependable tool for long service. Meehanite base permits drilling and tapping of holes when needed for quick setups on cylindrical grinders. The Angle Master dresses with the diamond point horizontal to the center of the spindle.

For more data circle 107 on Reader Service Card



J & S Plain Angle Wheel Dresser in use



SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2",
by 1/64"—plus handy 17/64" size. Length 4 7/8". ONLY \$16.80.
Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

For more data circle 440 on Reader Service Card



SOLID TYPE

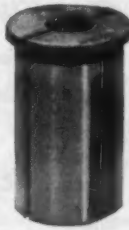
Hardened and Ground Tool Holder Bushings

These new tool holder bushings are hardened and ground
and priced lower than conventional soft bushings. Most
sizes in stock for prompt delivery. 3/4" to 3 1/2" O.D.—
any bore. Send for descriptive literature.

THE GAHR MACHINE CO.

19195 ST. CLAIR AVE.

CLEVELAND 19, OHIO



SPLIT TYPE

For more data circle 441 on Reader Service Card

People work better when they SEE BETTER



AT CUTLER-HAMMER

a tool room worker uses the MAGNI-FOCUSER
to read a Vernier Height Gauge

MAGNI-FOCUSER

SPEEDS PRODUCTION

With Third Dimensional (3-D) Vision

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces
eye-strain and prevents squinting—thereby speed-
ing production, increasing accuracy and minimiz-
ing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and
die work are just a few of the jobs that need the
Magni-Focuser. Speeds precision assemblies, blue
print work. Restores the usefulness of the skilled
hands of many older workers whose vision needs
a seeing aid.

Magni-Focuser can help your plant produce better.
Immediate delivery. 10-day trial without obliga-
tion. Return to us if not satisfied. \$10.50.

Send for descriptive folder

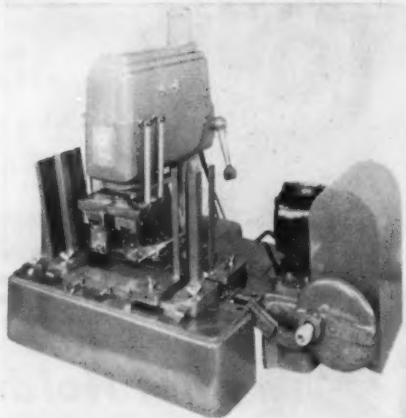
EDROY PRODUCTS CO. 480 Lexington Ave.,
Dept. P, New York 17, N. Y.

For more data circle 442 on Reader Service Card

new shop equipment . . .

MARKING MACHINE ACCOMMODATES VARIETY OF TAG SIZES

Marking tags—either metal or plastic—having both a serial number and constant details, all at one time and at speeds up to 8,000 per hour, is said



"Automark" Hi-Speed Tag Marking Machine



**NEW NESTING TYPE
TOTE PANS**

Sturdy 16 ga. metal.
20" long x 12" wide
x 6 1/4" deep. Drag
holes and handles at
both ends.

J. L. LUCAS & SON, INC.
Bridgeport 5, Conn.

For more data circle 443 on Reader Service Card



DORMAN AUTOMATIC REVERSE TAPPERS

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel — 1/2" in Aluminum.

No. 2B POSITIVE TAPPER—capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER—capacity 1/2" to 1 1/4" in Steel—1/2" to 3/4" Pipe Taps.

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

Priced from **\$50.00**
Write for Bulletin
IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1034 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

For more data circle 444 on Reader Service Card

276 modern machine shop

to be possible with an "Automark" Model SRST-2 Hi-Speed Tag Marking Machine, designed and manufactured by Defiance Machine & Tool Co., 1920 S. Vandeventer, St. Louis 10, Mo.

This machine features both a loading and unloading chute, which are adjustable to accommodate varying sizes of tags to be marked. Also, both the typeholders and the automatic numbering heads are adjustable over the work area to accommodate different tags, and only a few minutes are required to set up the machine for action. The manufacturer further states that the machine is quality made throughout of heat treated materials.

For more data circle 108 on Reader Service Card

CAM MILLING

JIG BORING



A SPECIALIZED CAM MILLING SERVICE.
JIG BORING
... SPOT WELDING
... CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO. 52-CN

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 445 on Reader Service Card

June, 1956

*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS



IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



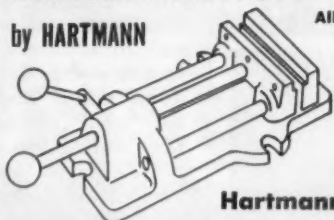
Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. • URBANA, OHIO

For more data circle 446 on Reader Service Card

INSTANT ACTION

by HARTMANN

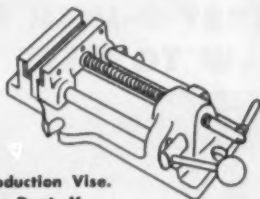


RAPIDSET

All Purpose Tool Room And
Machine Shop Visas.

The JAWSET

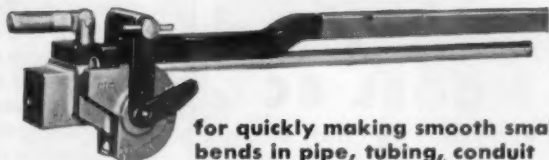
Adjustable Pressure Production Vise.
For Information Write Dept. M.



Hartmann Mfg. Co., 1637 Goold St., Racine, Wis.

For more data circle 447 on Reader Service Card

GREENLEE HAND BENDER

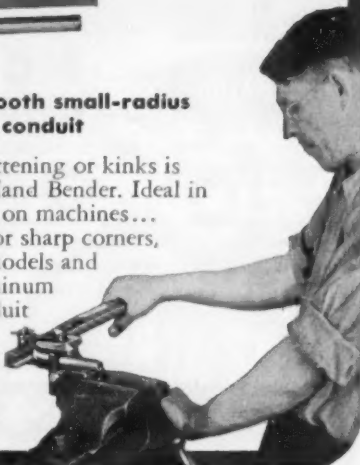


**for quickly making smooth small-radius
bends in pipe, tubing, conduit**

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines... especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit



**GET FREE FOLDER E-207 AND
BOOKLET E-201.** Complete
facts and prices on the Greenlee
Bender line. Write Greenlee
Tool Company, 158- Herbert
Avenue, Rockford, Illinois.



For more data circle 448 on Reader Service Card

new shop equipment . . .

GEAR CHECKER INSPECTS LARGE SPUR GEARS FOR ACCURACY

A Red Ring Model SIC-24 inch gear checker, that inspects spur gears up to 25½ inches o.d. as well as splines for accuracy of tooth size, spacing, eccen-

tricity and parallelism, is now available from National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. Spur gears and splined parts up to 11¾ inches between centers can be accommodated on the new checker.

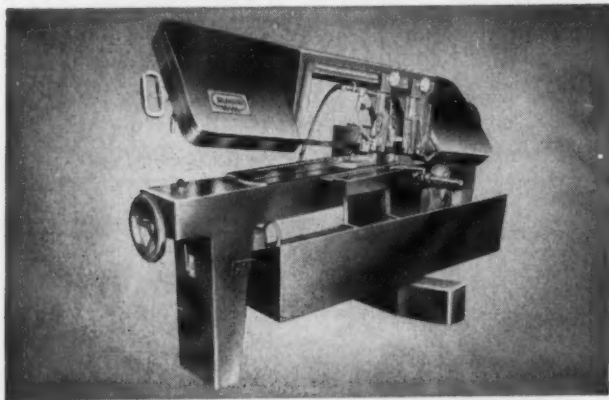
One of the main features of the checker is a unique type of slot design in the table surface which positions the various checking units in precision straight line and right angle locations.

This slot has a combination of straight and angular sides which provide for more built-in accuracy, improved hold-down power and less wear problems during use.

Gears to be checked are mounted between centers on head and tail-stock units that are slidably mounted through a slot in the top of a ribbed surface plate. Interchangeable heads are provided for checking eccentricity, size combination and tooth - to - tooth spacing.

Parallelism accuracy of each side of a spur gear or spline tooth is checked by a double indicator head unit mounted in an LCA precision ball bearing slide unit in front of the part being

FIRST 8-INCH METAL CUTTING SAW TO MEET TODAY'S NEEDS



KALAMAZOO

MODEL 8C

cuts 8" round, 16" flat, 8" pipe

Instant-acting vise holds work-piece. Four speeds for best cutting. Accuracy easily controlled—blade action in cut easy to see. Blades changed in seconds. Automatic shut-off. All parts readily accessible. Ask your Kalamazoo dealer to demonstrate Model 8C.

Kalamazoo Metal Cutting Band Saw Machines:

KALAMATIC BAR FEED for Kalamazoo.

MODEL 1220 cuts 12" round, 20" flat.

MODEL 610 cuts 6" round, 10" flat.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

610 HARRISON STREET

--

KALAMAZOO, MICHIGAN

For more data circle 449 on Reader Service Card



NEW 1956 MODEL "SS" RADIUS DRESSER

outperforms them all
Cut production time
without sacrificing accu-
racy! Easy to set, easy
to see, eliminates nec-
essity of guard removal.
Somerset Radius Dress-
er turns "tricky" jobs
into routine operations.

At new low price \$124.50
with diamond.

Write for free
illustrated folder.

SOMERSET TOOL CO.

320 Virginia St.
Hillside, N. J.

For more data circle 450 on Reader Service Card

C A M S

Fully equipped modern machine shop with
extensive Jig Boring, Surface Grinding,
Horizontal Boring and Thread Grinding
facilities as well as modern Cam Milling
and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.

23-16 44th Road Long Island City 1, N. Y.

For more data circle 451 on Reader Service Card

BARKER Bench Type MILL for Production Milling of Small Parts by Unskilled Help



\$295.00
As Shown



**Screw Feeds
Optional**

**at Extra
Cost.**

Write for
Details

**BARKER
ENGINEERING
COMPANY**

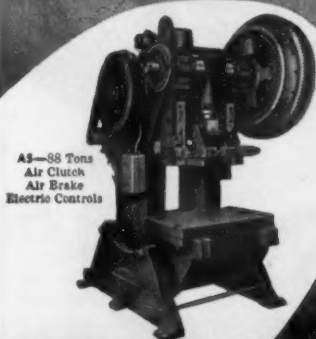
500 GREEN RD., CLEVELAND 21, OHIO

For more data circle 452 on Reader Service Card

June, 1956

**Backed by nearly
a half century of
dependable performance**

**... yet modern to the minute
for today's exacting demands.**



AS—88 Tons
Air Clutch
Air Brake
Electric Controls

- Engages smoothly; no sledge hammer blow.
- Inched, single stroke, or continuous.
- Less heat as brake is released when clutch is engaged.
- Less current used; brake is off when clutch is engaged.
- Clutch torque output in direct ratio to applied air pressure and controlled by regulator valve.
- Two run buttons, one stop button, one inch button operate on 110 volt regardless of motor current (220 or 440).
- No back lash when using air cushion or heavy spring pressure pads.
- Clutch is reversible. (By reversing wires on motor you can inch out of stall).

Robinson Presses are available (in either pin type or air clutch models) in sizes from 32 to 88 Ton.

**ROBINSON
PRESSES**

Write for illustrated
brochure and
specification sheet.

**NEW ALBANY MACHINE MFG. CO.
NEW ALBANY, INDIANA**

For more data circle 453 on Reader Service Card

modern machine shop 279

new shop equipment . . .



Red Ring Model SIC-24 Inch Gear Checker

checked. The base of the slide unit is locked in a slot in the surface plate, which is at right angle location to the slot into which the head and tailstock are locked. This slide unit has a 9 inch travel and moves the indicator finger across the tooth face with a handwheel control.

Eccentricity and size are checked by an ECA indicator unit at the rear of the part being checked. The base of the ECA unit locks into a continuation of the same slot as the LCA slide unit.

Tooth-to-tooth spacing is measured by removing the ECA unit and replacing it with a ICB tooth spacing head. Quick-lock devices enable the ECA and ICB units to be easily and quickly interchanged.

The gear checker occupies a floor space of about 60 inches by 51 inches and has a 50 $\frac{3}{4}$ inch distance from the floor to the work centerline.

For more data circle 109 on Reader Service Card

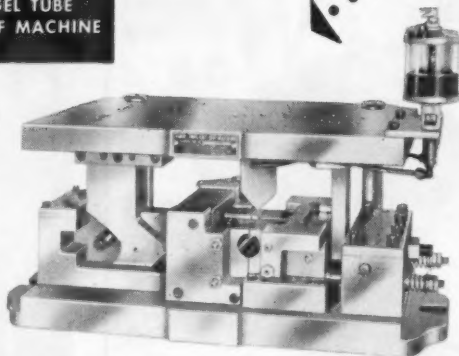
***Cuts Tubing to Accurate Lengths in
—SPLIT-SECOND TIME!***

LENGTHS of $\frac{1}{2}$ inch or more are accurately cut to $\pm .010''$ with each stroke of press—actually less than $\frac{1}{3}$ of a second or faster than any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

Unit No. 12 accommodates tubing up to $\frac{1}{2}''$ O.D. with $\frac{3}{32}''$ wall; the No. 2 takes tubing up to 2" O.D. with $\frac{1}{8}''$ wall.

Ask for sample showing how clean-cut your tubing can be sheared with this machine.

**VOGEL TUBE
CUT-OFF MACHINE**



PATENTED

VOGEL

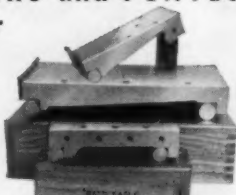
TOOL AND DIE CORPORATION
1823 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

For more data circle 454 on Reader Service Card

ACCURATE—LOW COST SINE BARS and PLATES

5" Sine Bar
only
\$21.75

- Guaranteed Accuracy
- Precision Ground
- Hardened Rolls
- Double Normalized
- Tapped Holes
- End Plates
- Solid Oak Case Extra
- Immediate Shipment



Sine Plates and Bars

No.	Cont. Dist.	Width	Price	With Oak Case
1605	5"	3"	37.50	43.00
1610	10"	5"	87.50	95.00
1705	5"	1"	21.75	25.25

FOB St. Paul.

Accurate to .0002" in center distance and parallelism for the length of the tool. Order Today—from your dealer or direct.



Bald Eagle Tool Co.

357 Minnesota St.

St. Paul 1, Minn.

For more data circle 455 on Reader Service Card

INSPECTION PROBLEMS?

This booklet is for you!



Free on request

Fill in and mail today

This comprehensive, elaborately illustrated booklet provides practical information on the use of the famous A. C. M. I. Bore-scope in various industries, for the inspection of interior areas or surfaces not otherwise visible—together with full data on the types of Borescope available, and on their care and maintenance. Have you received your copy?

To **American Cystoscope Makers, Inc.**

1241 LAFAYETTE AVENUE

NEW YORK 59, N. Y.

Gentlemen: Please send me without obligation a copy of your booklet on Borescopes.

Name _____
Firm _____
Address _____
City _____ State _____

For more data circle 456 on Reader Service Card

June, 1956

For Arbor Spacers and Shims,
Feeler Stock or Shim Stock...

specify top-quality



ARBOR SPACERS AND SHIMS

20 arbor sizes $\frac{3}{4}$ " to 4" ... 19 thicknesses .001" to .125"

Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) $\frac{1}{4}$ " to 3" long in all popular sizes. (For use in milling, slitting and gang-saw setups, shimming gears and bearings.)

FEELER STOCK

Made from tempered stock, rolled to close tolerances.

$\frac{1}{4}$ " x 25' coils packaged in transparent plastic boxes, except above .020". Strips $\frac{1}{4}$ " x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)



SHIM STOCK

Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in assortment package of 12 thicknesses .001" to .015".

For details and prices,
write for descriptive literature.



Detroit Stamping Co.

349 MIDLAND AVE. • DETROIT 3, MICH.

For more data circle 457 on Reader Service Card

modern machine shop 281

new shop equipment . . .

**VALVE FOR AIR
OPERATED CLUTCHES**

A new model of the Danly Dual Air Valve for press operation has been announced by Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill. The valve is specifically designed to actuate the clutch and brake of mechanical power presses. The new model represents several important refinements of the previous model. It is said to eliminate one of the chief hazards of mechanical press operation—accidental stroking due to valve failure. This feature provides an added degree of safety for all presses using air-operated clutches.

The new valve has been simplified, many of its components strengthened



Illustration showing Danly Dual Air Valve

and its overall size has been reduced. This new construction is said to offer long operating life, great accessibility and easy maintenance. The valve also requires less power to operate.

The valve actually consists of two valve elements working independently in parallel, and cross ported with extra large exhaust outlets. Should either element fail, the clutch will be exhausted and disengaged normally through the second valve element. The safety factor of the valve is not dependent on its mechanical life. The only chance for unsafe failure is that both valve elements fail simultaneously in the open position.

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.



Write for Circular
**NIELSEN TOOL &
DIE COMPANY**
P. O. Box 1067
Berkley, Mich.

For more data circle 458 on Reader Service Card

For more data circle 110 on Reader Service Card

SIZES
1 1/2"
2 1/2"
3"
4"
6"
8"

Jaws with
SWIVEL BASES



**ANGLE VISES
6 JAW
SIZES**

PALMGREN

for **MILLING MACHINES,
DRILL PRESSES,
GRINDERS, SHAPERS...**

64 different models and types of vises, rotary tables, milling attachments, and other machine tool accessories.

WRITE FOR
CATALOG #203.

**MILLING MACHINE VISES
No. 40B and 60B**

**4" and 6" Jaws
with or without
SWIVEL BASE**



CHICAGO TOOL AND ENGINEERING CO., 8399 South Chicago Avenue, Chicago 17, Illinois

For more data circle 459 on Reader Service Card

Small PRECISION PINS

**MADE TO
BLUE PRINT**

Dowel — Straight
Countersunk — Taper
± .0001" Accuracy
.030" to .125" Diam.
Up to 2" Length

Precision Centerless Grinding Since 1931
Inquiry Invited on Your Volume Requirements

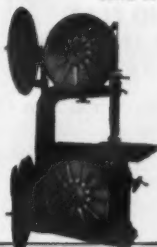
**COMMERCIAL
CENTERLESS
GRINDING CO.**
6605 CEDAR AVE. Phone EM 1-3412 CLEVELAND 3, O.

For more data circle 460 on Reader Service Card



WHEELS AND GUIDES

Carter band saw accessories used as standard equipment by leading band saw manufacturers.



- Rigid Band Saw Wheels
- Demountable Tires
- Micro-Guides
- Guide-Line Lights



CARTER PRODUCTS CO. INC.

326 Wm. Alden Smith Bldg., 30 Iowa Avenue, S. W.
GRAND RAPIDS 2 MICHIGAN

For more data circle 461 on Reader Service Card

MULTIPLE DRILLING with a...



➔ MULTI-DRILL

**Increases Capacity Up to 800%
ADJUSTABLE TO ANY HOLE PATTERN
... FITS ANY DRILL PRESS**

If your production requires drilling from 2 to 8 holes in a work piece, a MULTI-DRILL will cut costs and speed output up to 800%. The MULTI-DRILL is universally adjustable to any hole pattern—is compactly built to permit easy, unhampered operation with drill jigs or other special fixtures. Ruggedly built to take the wear and tear of high production work, the MULTI-DRILL will handle your long and short run multiple drilling jobs with ease and economy. The MULTI-DRILL will drill on hole centers as close as 1/2"—handle drill sizes up to 3/8" in steel. Special adaptations available.

COMMANDER MFG. CO.

4224 WEST KINZIE ST.

CHICAGO 24, ILL.

Product of Commander — Builder of Production Tools

For more data circle 462 on Reader Service Card

new shop equipment . . .

PRECISION GROUND FLAT STOCK AVAILABLE IN WIDE RANGE OF STANDARD SIZES

The Henry G. Thompson & Son Co., New Haven, Conn., has announced the availability of Milford Precision Ground Flat Stock in a wide range of

standard sizes. Stating that no finish grinding is required, the manufacturer claims that this stock is precision ground to a fine velvet finish. Flat surfaces are parallel and straight. Edges are ground parallel and accurately squared to the ends.

This ground flat stock is available in two types of steel—Oil Hardening, a general purpose electric furnace non-deforming tool steel—and Air Harden-

ing, recommended wherever extra resistance to wear is required. Both types, it is claimed, will maintain dimensional accuracy closely throughout heat treatment. A fine grain structure produces maximum toughness with a high hardness.

The ground flat stock is supplied in a fully spheroidized, annealed condition for easy machining. Hardness obtainable ranges up to 65 Rockwell "C" scale. Oil Hardening is available in standard sizes, listed in 18 or 36 inch lengths. Air Hardening is available in 36 inch lengths.

Each piece of the ground flat stock is coated with compound and individu-

The New
Super-Hard
Carbide Drill

Up to
200%
Greater
Life

A Better Drill For Hardened Steel

Long carbide end keeps cutting heat away from braze.

Send for Current Literature

QUALITY CARBIDE TOOLS

Super
TOOL COMPANY

21650 Hoover Rd., Detroit 13 • 2110 San Fernando Rd., Glendale 3

Subsidiary of Van Norman Industries, Inc.

Dept. 349

For more data circle 463 on Reader Service Card

Magnetic Base Indicator holders



Stainless holding rod set in ball socket

Precision adjustment like surface gage

Erick Magna Holder Model 200B
Only \$5.45

See your dealer or write for catalogue 755 on the most complete line of magnetic base units & access. mfg'd.

Powerful 50 lb. pull base

CULLEN MFG. CO., RACINE, WIS.

For more data circle 464 on Reader Service Card

JIG BORING

and

Large Precision Machining

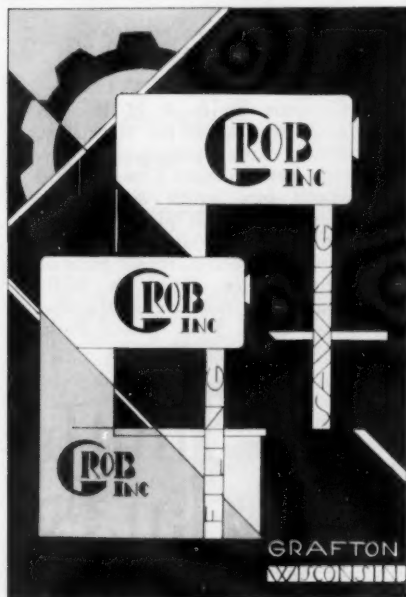
Done to your specifications

We Have 21 Jig Borers

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 465 on Reader Service Card



ROB INC.

ROB INC.

ROB INC.

GRAFTON MACHINE SHOP

For more data circle 466 on Reader Service Card

June, 1956

long life



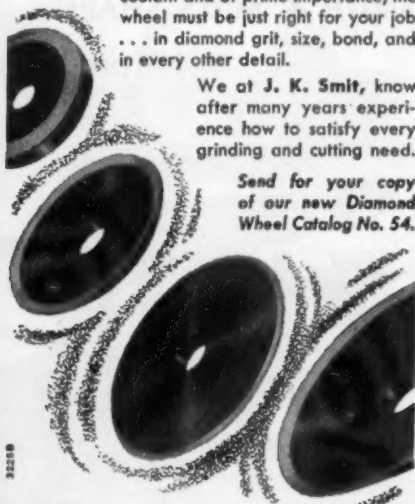
means
dollars saved!

Whether a 200 year old tortoise would admit this statement is debatable, but with Diamond Wheels it is an indisputable fact.

Even then, long wear depends upon many factors; Speed, correct use of coolant and of prime importance, the wheel must be just right for your job . . . in diamond grit, size, bond, and in every other detail.

We at J. K. Smit, know after many years' experience how to satisfy every grinding and cutting need.

Send for your copy of our new Diamond Wheel Catalog No. 54.



J. K. SMIT & SONS, INC.
HOME OFFICE AND PLANT
MURRAY HILL
NEW JERSEY

For more data circle 467 on Reader Service Card

modern machine shop 285

new shop equipment . . .

ally packaged in a specially designed wrapper, which the manufacturer maintains will protect stock against handling, rusting or scratching, thus eliminating damage loss.

For more data circle 111 on Reader Service Card

★ ★ ★

HIGH FREQUENCY INDUCTION HARDENING MACHINE

A high frequency induction hardening machine has been developed by the Process Machinery Division of the Cincinnati Milling Machine Co., Cincinnati 9, Ohio. The induction hardening machine consists of three primary units; namely, power supply unit, oscillator unit and work unit. The work and oscillator units can be placed di-

rectly in a production line and, if desired, the power supply unit can be located several hundred feet away in an area of low cost floor space.

The key feature of the machine, rated a 30 kw., is its unusual high frequency range; 1,200 to 1,400 kilocycles. This is said to permit rapid surface hardening of parts requiring shallow case depth and very narrow transition zones between case and core, as well as for any small or thin walled parts. Solid parts, such as shafts up to 2 inches in diameter, can be hardened, while the capacity for non-solid parts depends upon their geometry.

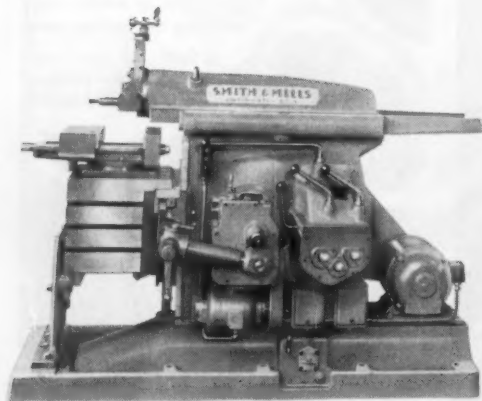
The use of higher than average frequencies not only results in faster operation, but also prevents scale from forming on the part and reduces distortion to an absolute minimum, eliminating most straightening operations completely.

The machine can be equipped with

★ ★ ★ ★ ★

SMITH & MILLS SHAPERS

for production and tool room



Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. *Compare* and you'll *buy* Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., 3409 Central Parkway, Cincinnati 25, Ohio.

Smith
AND
Mills
SHAPERS CINCINNATI

For more data circle 468 on Reader Service Card

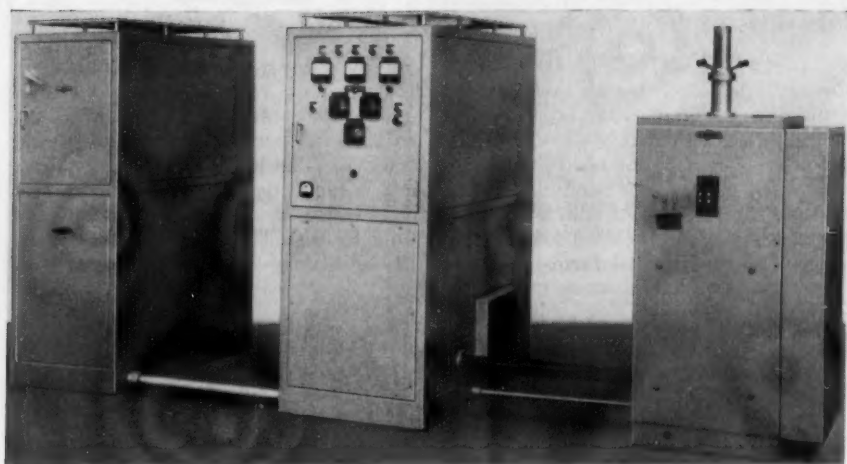


Illustration showing overall view of Cincinnati High Frequency Induction Hardening Machine

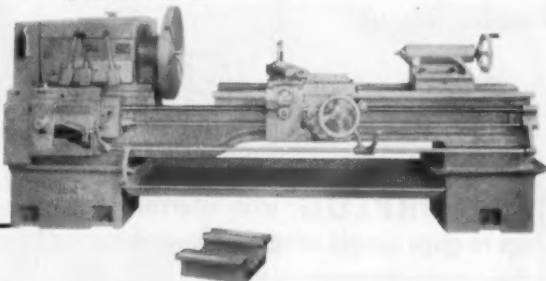
an automatic work handling system and automatic controls for high production runs. It is also well suited to

low production type of operations.

The work unit is so designed that tooling can be easily changed. The use

★ ★ ★ ★ ★

NEBEL Removable Block Gap Lathes



● Swing all your odd-shaped, outsize turning jobs in the wide, deep gap of the Nebel removable block gap lathes. Replace the block and you have a standard lathe for normal turning operations.

This double duty feature increases the productive capacity of the lathe almost 50%, yet it costs only

a few dollars more than a standard lathe. Made in three swing sizes (see below).

Nebel also manufactures extension bed gap lathes, 20"/40" and 28"/50" sizes; standard lathes 16" to 36" sizes. Write for bulletins, Nebel Machine Tool Corp., 3409 Central Parkway, Cincinnati 25, Ohio.

	Swing over ways	Swing thru gap	Bed length*		Spindle speeds range, rpm
			min.	max.	
16"/27"	18½"	27½"	6 ft	20 ft	13-400 or 24-750
20"/30"	22½"	31½"	6 ft	20 ft	10-320 or 20-640
25"/40"	27"	41"	10 ft	24 ft	9-280 or 16-500

*increasing in increments of 2 ft.



For more data circle 469 on Reader Service Card

new shop equipment . . .

of a variable output transformer makes it possible to "dial a tool change" by varying the heat input to the coil. This can often eliminate the need to change coils when part size or configuration is changed during low production runs. It also eliminates the need for a large stock of expensive coil forms or mas-

ter dies for use in forming coils. In fact, the operator can often form a coil by simply bending it around his fingers.

Ease and safety of maintenance are an integral part of the design of the machine. The location of circuit troubles is facilitated by channel duct wiring, while "trouble check" lights save time by visual location of difficulties. In addition, "fail-safe components"

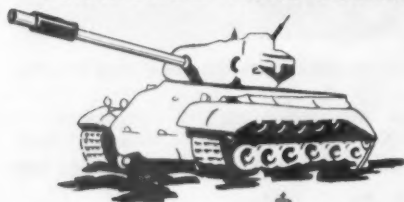
limit possible damage to restricted areas which reduces maintenance costs. Safety for the operator is provided by low voltage potential at the work coil, eliminating the possibility of shock if it is accidentally touched. Positive interlocks on all units are said to prevent servicing of the units while electrical power is on.

In addition to all of these design features, the use of conservatively rated components throughout the machine results in long life of all units. When the machine is running at full capacity, none of those component parts are working at near their rated maximum output.

For more data circle 112 on Reader Service Card

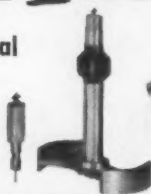
Did you know that . . .

Major ordnance items are quality-controlled with Comtorplug



Precision Internal Gage

SIZES FROM
 $\frac{1}{8}$ " to 8"
AND LARGER



COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from $\frac{1}{8}$ " to 8" dia.

Unique Advantages

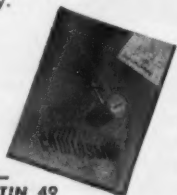
- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable—no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

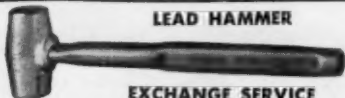
COMTOR COMPANY

64 Farwell St.
WALTHAM 54,
MASS.

GET THE FACTS—
REQUEST BULLETIN 49



For more data circle 470 on Reader Service Card



LEAD HAMMER

EXCHANGE SERVICE

Long-life lead-alloy head. Non-twist, non-loosen, non-slip comfortable grip handle.

Size	Initial Cost	Exchange Price
1½ lb.	\$1.50	\$0.75
3 lb.	1.90	0.95
5 lb.	3.20	1.60

IT DOES NOT PAY TO MAKE YOUR OWN

PO-RO PRODUCTS

CLAMP SUPPORT BLOCKS

½" to 10" height (in 1/16" adjustments) with one set of blocks.



- SLIP PROOF SERRATIONS
- FLAT SURFACES
- HARDENED STEEL

\$13.50 per set consisting of:

- 4 No. 1 Half Blocks, ½" to 1"
- 4 No. 2 Half Blocks, 1" to 2½"
- 4 No. 3 Half Blocks, 2½" to 6½"

SAVE TIME, SPACE AND MACHINE BEDS

PODLIN TOOL CO. 11847 FRANKLIN AVE. BENSENVILLE, ILL.



Tool engineer of leading manufacturing plant

"Production is up 112% since we installed specially designed, ESSEX high speed steel rotary files."

"Formerly, we used standard type rotary files to cut magnesium. Since we switched to specially fluted, high speed steel files by ESSEX, production is up 112%!"

Find out how ESSEX high speed and carbide tools can help you save. Write for free, 12-page illustrated catalog today.

ESSEX ROTARY FILE & TOOL CORP.
295 MADISON AVE., N. Y. C. 17 MMS 66

My name.....
Company.....
Address.....
City..... Zone..... State.....

For more data circle 471 on Reader Service Card

For more data circle 472 on Reader Service Card

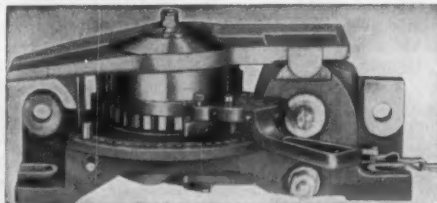
CUT COSTS

ON SECONDARY OPERATIONS

WITH THE

DEARBORN

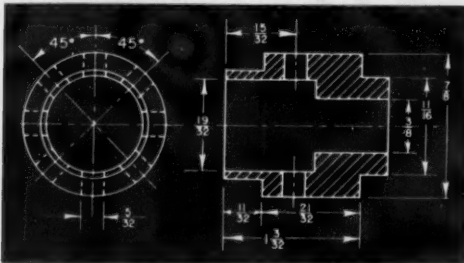
AUTOMATIC CHUCKING AND INDEXING FIXTURE



Features:

1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
4. Automatic indexing if required
5. Three models with capacities from 1/32" to 2"

Write for illustrated data.
Send blueprints or specifications of work.



This piece was made from Brass. It was necessary to drill all holes from the outside to minimize the burring time. Production was about 100 pieces per hour or 800 holes per hour.

J. W. DEARBORN
ANSONIA • CONN.

For more data circle 473 on Reader Service Card

new shop equipment . . .

TOOL EJECTOR ENDS DAMAGE TO MACHINE SPINDLES AND TOOLS

A new cam-type tool ejector, developed by Scully-Jones & Co., 1909 S. Rockwell St., Chicago 8, Ill., is said to virtually eliminate damage to machine spindles and bearings caused by ham-



View of Scully-Drift Cam-Type Tool Ejector

mering on other tool removing devices. An important advantage of the Scully-

Drift is that it can be used with one hand, thus allowing the operator to maintain complete control of the tool with the other hand.

The tool ejector is simple to operate. It is designed with a cam-shaped profile on its bottom edge, so that a mere twist of the wrist generates a powerful force against the tang of the tool, breaking it free from its locked position in the internal taper of the machine spindle. This easy, trouble-free operation can mean a marked reduction in tool change time as an added bonus, along with a reduction in machine maintenance. No alteration need be made to machine spindles to

now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

FOR ECONOMICAL DRESSING —

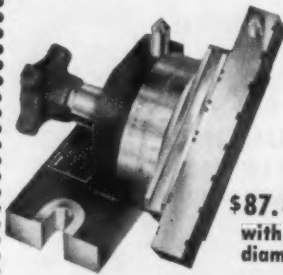
The G-5 radius dresser is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal gives chatter free operation that may be set to the exact radii desired.



\$80.00 with diamond

A LOW COST DOUBLE DUTY TOOL—

The G-2 angle dresser and tool holder is actually 2 tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc. on any desired angle.



\$87.50 with diamond

PLUS FREE HANDY STORAGE BOX.

\$149.50 COMBINATION PRICE FOR BOTH TOOLS WITH DIAMONDS.

Send your order direct but include the name of your distributor.

DISTRIBUTORS WANTED. Write for complete information.

ROTHFUSS TOOL CO.

Box 202 Elmwood Station • Providence 7, R. I.

For more data circle 474 on Reader Service Card

take advantage of this precision tool. The ejectors are now available in sizes for No. 2 and 3 Morse taper spindles. For more data circle 113 on Reader Service Card

★ ★ ★

END MILL HAS NEW TYPE OF FLUTE CONTOUR

Eclipse Counterbore Co., 1600 Bonner Ave., Detroit 20, Mich., has an-

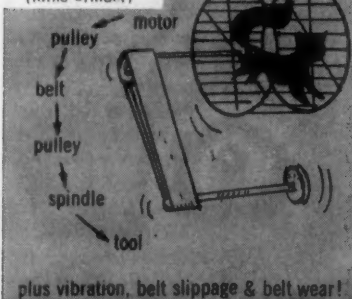


Eclipse End Mill with new type flute contour

nounced its entrance into the end mill field, thus making available to the metal machining industry an entirely new type of flute contour. According to the manufacturer, the shape of flutes—

Take the direct approach to versatile tooling!

The old way (lathe grinder)



the Precise way



... in one powerful electric unit, easily mounted, with variable speed control!

REPLACE OLD-FASHIONED LATHE GRINDERS WITH PRECISE POWER QUILLS!

Power Quill is a new name for a new tool that outperforms and outlasts lathe grinders, and saves fortunes through increased tooling versatility! Precise Super 60 Power Quills are unlimited in application, can be used on any machine and mounted in any position to mill, grind, finish, or micro-mill any material with abrasive wheels and tungsten carbide tools. And look at these exclusive Power Quill features:

OPERATE AT SPEEDS UP TO 45,000 RPM, DEVELOP FULL $\frac{1}{2}$ H.P.

CAN FINISH TO 5 MICRO INCHES AND .0001" TOLERANCES ON PRODUCTION MILLING AND GRINDING WITH CARBIDE TOOLS.

MOTOR AND SPINDLE ARE IN ONE COMPACT, DIRECT-LINE, SOLID STEEL PACKAGE WITH GREATER SPEED (45,000 RPM) TORQUE, ACCURACY, AND RIGIDITY.

REMOVE METAL FASTER, BETTER SURFACE FINISHES, INCREASE TOOL LIFE.

MOUNT IN ANY POSITION, ON ANY MACHINE, WITH PRECISE MOUNTS—FAST!

Attach this ad to your letterhead for FREE demonstration or literature!

PRECISE PRODUCTS CORP.

1345 CLARK STREET

RACINE, WISCONSIN

Quality and precision since 1882

Grinder-Millers • Power Quills • High RPM Milling Machines
Mounts and Accessories • Rotary Tools

Precise

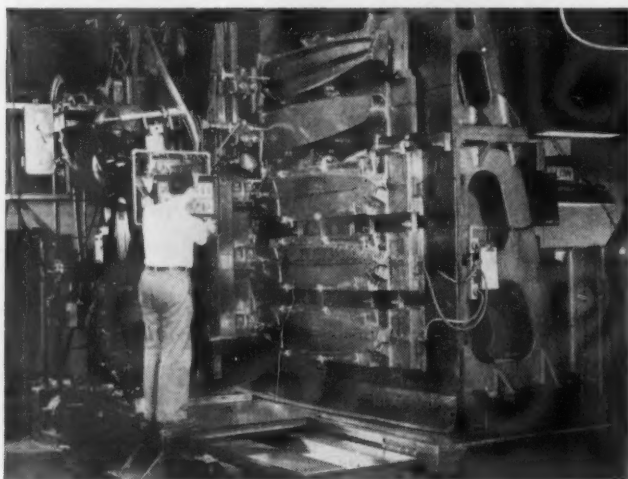
For more data circle 475 on Reader Service Card

new shop equipment . . .

width, depth, curve of hook and form relief—have been determined and perfected as a result of several years of research.

For more data circle 114 on Reader Service Card

Walker Does It Again--



Three WALKER electro-magnetic chucks mounted on milling machine, making possible profile milling three propeller blades in one operation.

WALKER engineers and makes chucks for unusual applications as well as standard holding devices for irons and steels, non-ferrous metals and non-metallic materials.

Whatever your holding problem the originators of the magnetic chuck will solve it for you.

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

IN CANADA — UPTON BRADEEN & JAMES, LTD.

For more data circle 476 on Reader Service Card

THREAD ROLLING MACHINE

A circular roll threading machine for high production thread rolling of studs, machine screws, and so on, has been announced by The Sheffield Corp., Dayton 1, Ohio. Equipped with hopper feed, it will produce up to 5,200 parts per hour, ranging in thread size from $\frac{1}{8}$ to $\frac{3}{4}$ inch o. d. by 2 inches long.

Rolling is performed by two interchangeable and reversible precision ground rolls, rotating at different speeds and mounted on heavy duty roller bearing spindles. Drive is by positive worm and wheel control, powered by a $7\frac{1}{2}$ h.p. motor. The machine has no cams, slides, hydraulic systems, fixed work rests or reciprocating motions. The desk-type base, 3 x 4 feet, has operator knee room and houses the motor, coolant tank and pump.

Parts are fed tangentially between the rolls by a revolving work feeder ring, falling free after rolling down a chute to a container. The feeder ring can be magazine loaded, manually

HAND KNOBS



6 SIZES CAST-IRON

Tapped, Reamed
or Blank
Hex-shaped hub for
extra tightening

Write for catalog

**TIETZMANN TOOL
CORPORATION**

ENGLEWOOD, OHIO

DEPT. HK-1

For more data circle 477 on Reader Service Card

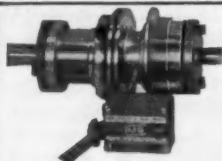


DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

For more data circle 478 on Reader Service Card



Transmission Type

RLH

CONSTANT TORQUE COUPLINGS with AUTOMATIC COMPENSATION

for Friction Variation

WRITE FOR BULLETINS



Spindle
Type

Torque settings unaffected by normal variations in co-efficient of friction. Breakaway torque and running torque become truly constant.

SPECIAL SHANKS FURNISHED TO ACCOMMODATE INDIVIDUAL APPLICATIONS

BUFFALO MACHINERY CO., Inc. 837 GRANT STREET BUFFALO 13, N. Y.

For more data circle 479 on Reader Service Card

Save Time . . . Labor . . . Materials with



Inside SLOTTER

Make cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.

BEVERLY metal cutting SHEARS

Throatless SHEAR

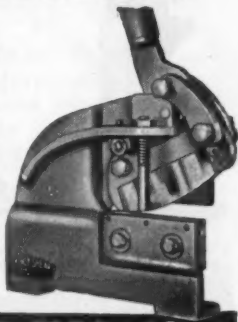
Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—cap. to 3/16".



Slitting SHEAR

New "SS" Series — easier cutting with compounded linkage. 3 models—cap. to 3/16"; trimming capacity to 5/16" mild.

See your Beverly Distributor.
Write for FREE Illustrated
Bulletin.

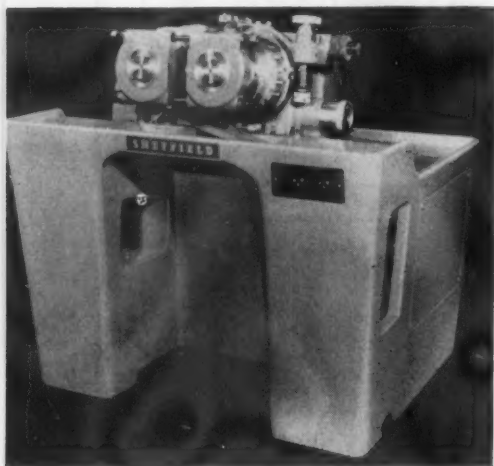


Beverly SHEAR MFG. CO.

3000 W. 111th STREET • CHICAGO 43, ILLINOIS

For more data circle 480 on Reader Service Card

new shop equipment . . .



Sheffield Circular Roll Threading Machine
for studs, machine screws and other parts

or automatically. Completely equalized roll wear is said to be assured by the different roll speeds and timing of the feeder ring.

Pitch diameter adjustment is accomplished by a precision lead screw that advances the right hand roll and spindle through a micrometer type unit. Timing of the rolls is adjustable.

Rolls are available for any type thread form within the following size ranges: 0 to 1/4 inch o. d. x 2 inches long, 5/16 to 7/16 inch o. d. x 1 1/2 inches long, and 1/2 to 9/16 inch o. d. x 1 1/4 inches long.

For more data circle 115 on Reader Service Card

★ ★ ★

ENCLOSED CONSTRUCTION FEATURED IN SINGLE CRANK STRAIGHT SIDE PRESS

A single crank straight side press is now being built by Niagara Machine

GRANT RIVETERS




• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature — and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. . . Bridgeport 5, Conn

For more data circle 481 on Reader Service Card

**MORRISON 1"
AUTOMATIC
KEYSEATER**



Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required. Write for more information on the finest Keyseater on the market.

THE D. C. MORRISON CO.
P. O. BOX 10176 • CINCINNATI 1, OHIO

For more data circle 482 on Reader Service Card



WAITE ENVELOPES

protect

Shop Orders, Drawings,
Blueprints, Etc.

Two styles. No. 2 with fibre
back, No. 3 transparent both
sides. Non-inflammable ace-
tate windows. Special style
or size to order.

Write for details.

WAITE INSTRUMENT COMPANY

Dept. M, R.F.D. No. 1,

Chardon, Ohio

For more data circle 483 on Reader Service Card

HARGRAVE CLAMPS

A Complete Line of Clamps for all Purposes

Individually
Power Tested
for Better
Performance



"C", Steel Bar,
Quick Acting,
Wood Hand
Screws, Welders

WRITE FOR FREE CATALOG.

Showing Clamps, Chisels, Punches, Masonry Drills
for hand and power hammers, Carbide Drills,
Washer Cutters, and File Cleaners.

Stocked by Your Local Distributor.

THE CINCINNATI TOOL COMPANY

1947 Waverly Ave.,

Cincinnati 12, Ohio

For more data circle 484 on Reader Service Card



CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

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1114 E. 87TH ST.

CHICAGO 19

For more data circle 485 on Reader Service Card

June, 1956



Miccro Spray

LAY-OUT DYE

(Purple)

MICCRO Lay-Out Dye, long the
leader in its field, now available
in an AEROSOL package for
SPRAYING.

All the advantages—instant drying;
clear, sharp lines—*plus* easy-to-
use, dependable, efficient MICCRO
Spray container.

Regular MICCRO Supreme Lay-
Out and Identification Dye in
seven distinctive colors available
as always in brush-in-cap and
conventional containers.

Write for circular
on company letterhead

MICHIGAN CHROME & CHEMICAL COMPANY

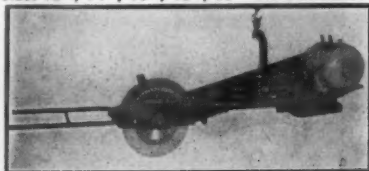
8615 Grinnell Ave., Detroit 13, Mich.

For more data circle 486 on Reader Service Card

modern machine shop 295

MUMMERT-DIXON SWING FRAME GRINDERS

Sizes 12", 14", 16", 18", 20" and 24" wheels.



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.

For more data circle 487 on Reader Service Card

STANDARDIZED MICRO DRILL GUIDES

All standard body styles available with hole sizes from $\frac{1}{80}$ to $\frac{1}{32}$ ". Tolerances of .0002 maintained on I.D., O.D., and concentricity.

ENGINEERED MICRO-TOOLING, DRILLS,
JIGS, COLLETS, ETC.

**MICRO
DRILL
GUIDE**



3980
Superior Ave.,
Cincinnati 36,
Ohio

For more data circle 488 on Reader Service Card



ONE tool holder for all positions...
No tool chatter...can do internal
boring or internal threading...
Ideal for carbide tools... Bit sizes:
 $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ".

ACME TOOL CO.

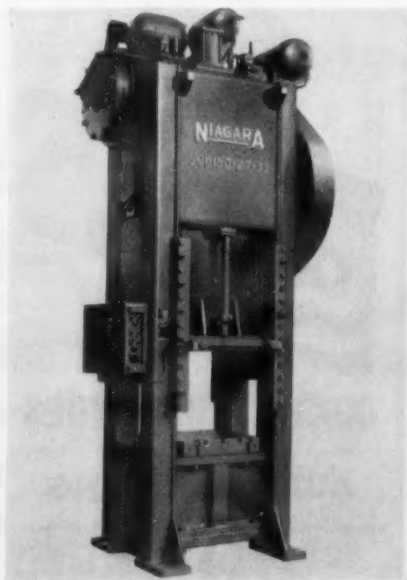
73 W. BROADWAY • NEW YORK 7, N. Y.

For more data circle 489 on Reader Service Card

new shop equipment . . .

& Tool Works, 683 Northland Ave., Buffalo 11, N. Y. This press features fully streamlined enclosed construction, front and back, which conceals the driving mechanism. There is no overhanging flywheel, clutch, brake, intermediate shaft or motor in the rear of the press to obstruct crane service, block light, throw grease or consume valuable floor space. Greater accuracy and long die life are said to be assured by the all-steel rigidly constructed one-piece frames of triple box section design, which provide maximum resistance to deflection from horizontal, diagonal and torsional stresses.

Box type welded steel slides are power adjusted through self-locking barrel type connections to accommodate a wide range of die heights and to permit quick, easy and safe die set-



Niagara Straight Side Single Crank Press

CUT-CUTTING TIME
NORDEX

Sheet and Plate Cutter speeds up cutting, slotting, beading, folding and dozens of other metal working jobs.

Low in price. Write for details and prices.

Nord Corporation

12 SPRUCE STREET
NUTLEY, NEW JERSEY



For more data circle 490 on Reader Service Card

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it" Simple to operate.



COMPLETE
LEAD HAMMER
SERVICE

Write
for circular
and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

For more data circle 491 on Reader Service Card

Carnes Coolant Sump Cleaners are high vacuum machines built to remove used coolant, chips and sludge from machine tool sumps in a matter of minutes.

Model
20T-NAW



Six models are available for handling everything from grindings to heavy chips in water soluble coolants and cutting oils. Filtering option available. The machines can be easily handled by one operator but if desired draw bar and towing hitch for use with plant tractors can be specified. Write for illustrated bulletin No. 4156.

COOLANT EQUIPMENT CORPORATION

VERONA 3, WISCONSIN

For more data circle 492 on Reader Service Card

June, 1956

PRODUCTION

Tripled

TOOL COST

Halved



with **W & S**

COMBINATION TOOL

A home appliance manufacturer was using four screw-machine stations for centering, drilling, counterboring and reaming for brass components. To increase output of the machines, Woodruff & Stokes was asked to design a combination tool to center, drill, counterbore and ream in *one operation*. The resulting tool cost half as much as the four tools it replaced, cut production time by two-thirds, by making double indexing possible.

Chances are, a tool designed by W & S small tool specialists can streamline your own production. Our tool specification sheet makes it easy for you to find out.



WOODRUFF & STOKES CO.

INCORPORATED

Bldg. 32, 353 Lincoln St.,
Hingham, Massachusetts

For more data circle 493 on Reader Service Card

modern machine shop 297

new shop equipment . . .

ting. Great shut height and long slide adjustment permit the use of a wide range of stamping and forming dies.

The manufacturer claims that electro-pneumatic clutch control insures safe, easy and efficient press operation.

The Niagara Straight Side Single Crank Press is available in capacities of 100 to 400 tons and can be equipped optionally with automatic lubrication,

pneumatic die cushions, automatic feeds, variable speed drives, knockout bars and other features to meet individualized needs.

For more data circle 116 on Reader Service Card

★ ★ ★

CHIP BREAKER GRINDER FOR LIGHT OR INTERMITTENT DUTY GRINDING

A chip breaker grinder has been introduced by Hammond Machinery Builders, Inc., 1615 Douglas Ave.,

Kalamazoo, Mich. Designed for medium-duty, the Model CM-6W is offered as a single end chip breaker grinder only, or as a combination chip breaker and diamond finishing grinder. The grinder incorporates a self-contained pump and tank unit with special no-splash guarding. A flood of coolant is provided, giving continuous cool cutting, increasing diamond wheel life and eliminating dust problems.

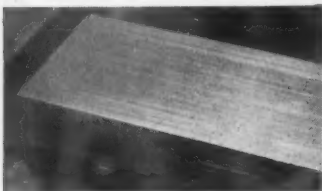
Recommended for light or intermittent duty grinding, the machine has a 1/2 h. p. built-in drive motor; accommodates 6 inch diameter chip breaker wheels and, with cup wheel arrange-

NEW, BETTER C/R way wiper

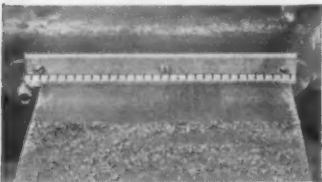
guards the life,
cuts downtime,
saves costly
maintenance on
machine tool ways



C/R Sirvene (synthetic rubber) Way Wipers will save you many times their cost by preventing scoring and abrasion of machine tool ways. Precision molded for extremely accurate fit, they will not trap harmful materials, but wipe ways clean of dirt, chips, fine abrasives and emulsions, leaving protective oil film. C/R Way Wipers are easily installed on flat ways, side rails, angles, columns and hydraulic rams. Write for detailed, illustrated brochure.



ABOVE, lathe way badly scored through inadequate protection; BELOW, C/R Wiper keeps mill way clear, smooth.

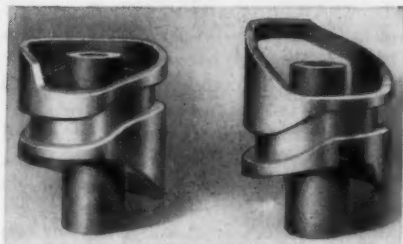


CHICAGO RAWHIDE MFG. CO.
1233 Elston Avenue Chicago 22, Illinois
IN CANADA: Manufactured and Distributed by
Super Oil Seal Mfg. Co., Ltd.,
Hamilton, Ontario.



For more data circle 494 on Reader Service Card

Rowbottom for Cams



Side and Barrel Cam . . . 7 3/8" Diam.—8 1/2" Long
Produced by Rowbottom. Material: Steel Casting.

Cams to YOUR specifications

When you need cams, you need Rowbottom Cam Production Service. As specialists in producing all types of cams, you can depend on our rigid adherence to specifications.

THE ROWBOTTOM MACHINE CO.
WATERBURY, CONNECTICUT

Also Cam Milling and Grinding Machines for producing cams of all types. Ask for details.

For more data circle 495 on Reader Service Card

WALLS TU-WAY BELT SANDER

USE IT
EITHER WAY

Full
1 1/3 h.p.
G. E. Motor



VERTICAL

HORIZONTAL

At last, a top quality industrial sander that provides all the most wanted features—yet sells for so little. **\$89.95**

complete with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 496 on Reader Service Card

June, 1956



TO BE SURE OF
QUALITY
Remember
the Name

HOGGSON

STEEL
STAMPS



CHAMFERED
CORNERS
for locating
the base

FINEST
STEEL

long
life



ALSO IN
REVERSE
FOR
MOLDS
& DIES

Letters and figures, deep-cut in hardened, special-formula steel, assure clean impressions and long service. Wide range of letter sizes. At your Mill Supply or write for circulars.

HOGGSON & PETTIS MFG. CO.

New Haven 7, Connecticut

For more data circle 497 on Reader Service Card

modern machine shop 299



Model
UL 7120

The Leading Machine
Tool Manufacturers

USE

**RUTHMAN
GUSHER**
COOLANT PUMPS

THE RUTHMAN MACHINE CO.

For more data circle 498 on Reader Service Card



**TRUE POINT
DRILL SHARPENER**

for Drills 41 - 60 and
61 - 80 R.H. & L.H.

A properly sharpened drill cuts
faster — more accurately and is
less likely to break.

Write for circular and
full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 499 on Reader Service Card

Spin your RIVETS

*faster and more
economically
on the NOISELESS
LINLEY
RIVETER*



Rivet spinning on the Linley
is a sure way to cut produc-
tion costs. With Linley equip-
ment, you can easily produce
finely finished rivets even in
close places. Send us samples
of the work you want riveted,
and without obligation we'll
show you how it can be done
the Linley-way and what it
will cost.

Machines available for hand-
ling iron and cold rolled
steel rivets up to 3/4" and
larger size rivets in softer
materials.

Send for Bulletin R today.

LINLEY BROTHERS CO.

Also builders of JIG BORERS

671 State St. Ext., Bridgeport 1, Conn.

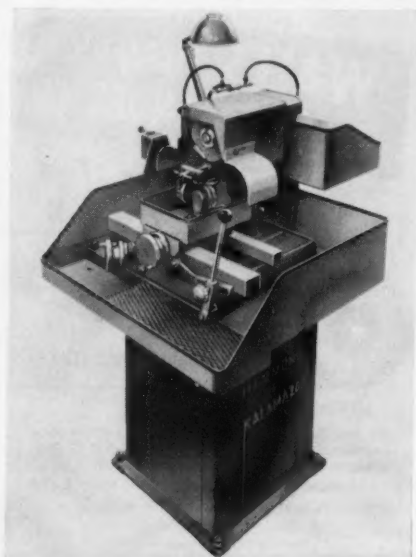
For more data circle 500 on Reader Service Card

300 modern machine shop

new shop equipment . . .

ment, uses a 6 inch diameter cup
wheel. Any-angle vise with four swi-
vel adjustments is furnished on the
chip breaker end, providing all angular
settings and accommodating tools up
to 2 1/2 inches. Head raising and low-
ering adjustments by micrometer dial
is calibrated to 0.001 inch. Cross slide,
with micrometer screw and dial, is
calibrated to 0.001 inch moved on dove-
tail ways with adjustable gib. Carriage
slides have protecting guards, and car-
riage reciprocating lever is adjustable
for strokes up to 7 inches. The ma-
chine is equipped with brake lever for
quick spindle stopping. Tilting work
table on cup wheel end adjusts from
30 above to 30 below horizontal, with
table moving in by screw feed.

For more data circle 117 on Reader Service Card



**Hammond Model CM-6W Wet Combination
Chip Breaker and Diamond Finishing Grinder**

June, 1956

**ENGLISH PRECISION ENGINEERING COMPANY
OF LIGHT/MEDIUM CAPACITY**

desires to contact an American Concern with a view to building their equipment under License for sale in the European Market.

Would prefer to build a machine of approved design having an established American Market, but will consider a machine having no established market, provided it is of unique design, giving it good sales potential. Representative Director, Mr. Wm. Brett, will be in the U. S. during June. Any correspondence, etc., addressed to him c/o Bank of America, New York, will have attention.

Canterbury Engineering & Precision Works, Ltd., Wincheap, Canterbury, Kent.

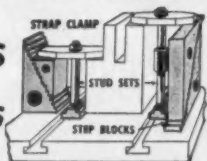
For more data circle 501 on Reader Service Card

**SURE GRIP STEP BLOCKS
STUD SETS**

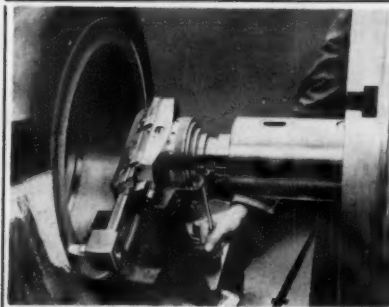
**STRAP
CLAMPS**

DEPT. SB-1

TIETZMANN TOOL CORPORATION
ENGLEWOOD OHIO



For more data circle 502 on Reader Service Card



Wohlhaupter MASTERHEAD

Nine Models from Smallest to Largest Work Ranges. Face-Bore-Turn-Recess-Undercut, etc. All Automatically up to 36 1/2" on one machine. For Precision Work and Most Economical and Automatic Operation.

- Twelve Automatic Slide Feeds
- Automatic End Release
- Increase Production; Make Better Finished Work

Illustrated: UPA6-S7—Our largest model.

Particularly well suited for the largest Jig Mills, Radial Drills and other Heavy Machines.

KARL A. NEISE, Dept. MMS
404 4th Ave., N. Y. 16, N. Y.

**NEISE
MODERN TOOLS**

For more data circle 503 on Reader Service Card

**STUDY....
these outstanding
features of the
New
CHESTERMAN
Vernier
Height Gage**

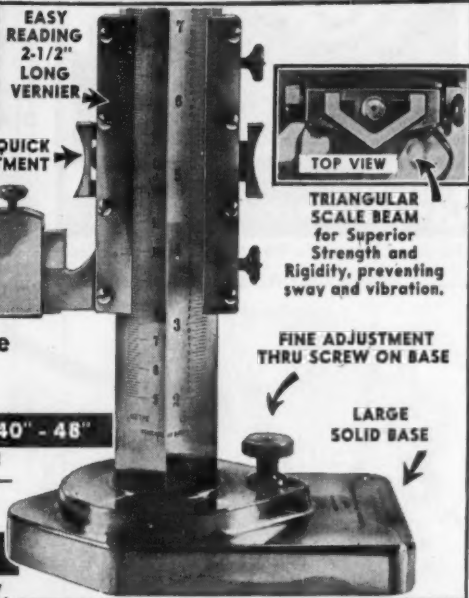
**The Most significant advance
in a quarter Century of
HEIGHT GAGE DESIGN**

Sizes Available: 12" - 18" - 24" - 40" - 48"

Ask for and Compare our Moderate Prices!
If not available at your favorite Supply House —
Write to us for 6-Page
ILLUSTRATED FOLDER—Code GIPDU

GEORGE SCHERR CO., Inc.

200-MM LAFAYETTE ST. • N.Y. 12, N.Y.

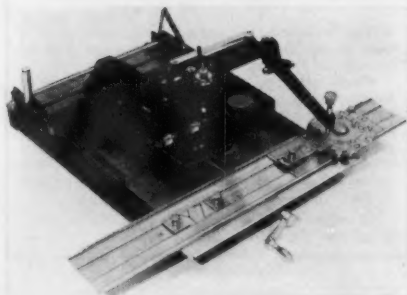


For more data circle 504 on Reader Service Card

new shop equipment . . .

TRACER-GUIDED MARKING METHOD

The development of a marking method called "Diamond Drag" has been announced by New Hermes Engraving Machine Corp., 13-19 University



New Hermes Tracer-Guided Engraving Machine

Pl., New York 3, N. Y. It is said to be particularly adaptable to the marking of turbo-jet blades.

To use the method, a special non-rotating diamond cutter is inserted into the spindle of a tracer-guided engraving machine. The jet blades are then clamped two at a time in a quick-acting workholding vise and pantographically marked. The large reduction ratio allows the accurate engraving of a 0.040-inch high identification symbol or consecutive number.

For more data circle 118 on Reader Service Card

★ ★ ★

DIAL THICKNESS GAGE

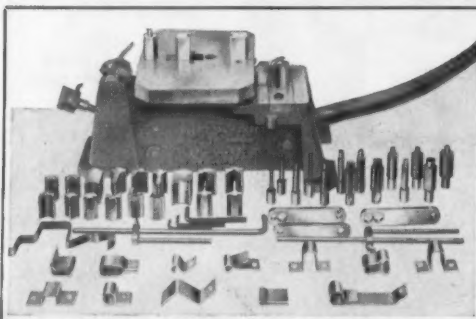
An adjustable dial bench gage for measuring the thickness of tubing, sheet material and so on, has been announced by Federal Products Corp., 6144 Eddy St., Providence 1, R. I. This gage

Enco
Self-Indexing
HEXTURET
Cuts Production Costs!

- Double Drive Gears
- Double Racks
- Assures Equalized Power
- Extreme Accuracy
- Mfgs. most complete line of Lathe Turrets. Send for latest catalog.
- Close tolerance shoulder-screw job held to plus .002; minus .000.

ENCO Manufacturing Co., Dept. 166
4524 W. Fullerton Ave., Chicago 39, Ill.

For more data circle 505 on Reader Service Card



Multiform BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

Kalamazoo, Mich.

For more data circle 506 on Reader Service Card



COOLANT MIST GENERATORS

HERE'S the simplest of all mist generators. Splendid results are obtained in all milling, drilling, sawing, tapping, turning or grinding operations. Ideal for lubricating punch press dies; also for applying parting agent to plastic and metal die casting molds.

Needs no special coolant. Produces finer finishes. Increases tool life. Increases production. Systems available for as low as \$30.

Write for circular 1255

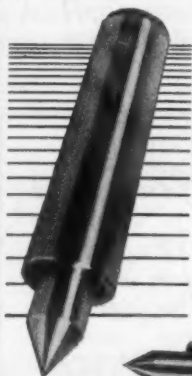
AETNA MFG. CO.

192 S. YORK ST.,

BENSENVILLE, ILL.

For more data circle 507 on Reader Service Card

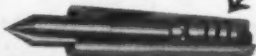
SPRING LOADED LIVE CENTER



Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write
for complete
information.

*Reg. U.S. Pat. Off.

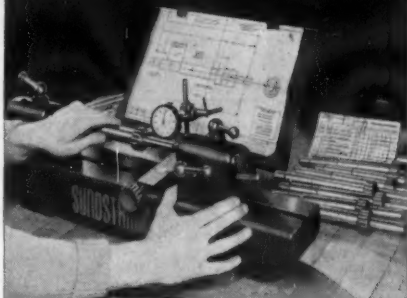


***NIROL** MANUFACTURING
COMPANY
901 H'WAY 22, N. PLAINFIELD, N. J.

For more data circle 508 on Reader Service Card

June, 1956

Keep a Close Check On Accuracy With SUNDSTRAND Bench Centers



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data

covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 569.



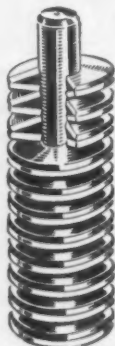
SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

For more data circle 509 on Reader Service Card

modern machine shop 303

Why SCHNORR Disc Springs?

Because:



1. Unlimited life within borders of permissible loads.
2. No creeping, initial settling or gradual fatigue.
3. Axial center pressure.
4. Exact adjustment to the desired pressure.
5. Small constructional height, large deflection.
6. Large inherent damping.
7. Large impact damping especially with multiple stacking.
8. Excellent space disposition.
9. Spring pressure, Spring length and Spring deflection can be easily determined for the same Spring size or can be changed by lengthening or shortening of the Spring columns or by multiple stacking. In special cases the character line can be made to divert from its usual straight form by diversified stacking.
10. Most Spring sizes available from stock.

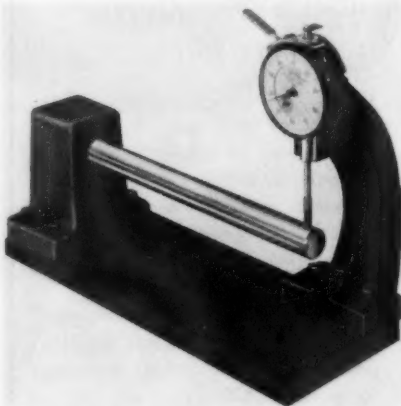
For more data circle 510 on Reader Service Card

• For descriptive literature write

**NEISE
MODERN TOOLS**

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

new shop equipment . . .



Federal Model KB-410-411 Dial Bench Gage

is equipped with a precision mandrel, on which the work is positioned, and a full-jeweled, low-friction dial indicator, which magnifies the dimension.

The throat depth on the versatile gage can be varied in increments of 1 inch by relocating the dial indicator support arm in holes provided in the gage base, and sliding the mandrel the required distance. The Model KB-410 has an adjustable throat depth from 4 to 8 inches, and Model KB-411, from 8 to 12 inches.

For more data circle 119 on Reader Service Card

CUTTING STOCK DIAMETERS UP TO 40 INCHES?

USE

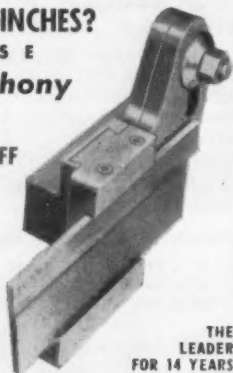
Skee-Anthony

(PATENTED)

CUTTING OFF
TOOLS

for . . .

- ★ BORING MILLS
- ★ LATHES
- ★ PLANERS
- ★ SHAPERS



THE
LEADER
FOR 14 YEARS

Patented Pivoting Trunnion, Safety-Slip and Support Blade prevent blade breakage and injury to operator. Fast adjustment to lathe center.

Write for free descriptive folder A-1

SKEE TOOL COMPANY
1406 N. FLORES ST.
SAN ANTONIO, TEXAS

• Few Industrial Areas Open for Representatives •

For more data circle 511 on Reader Service Card

GRIND THE

*Eastern Centerless
Way*

Our new plant with
increased facilities
assures

PROMPT SERVICE

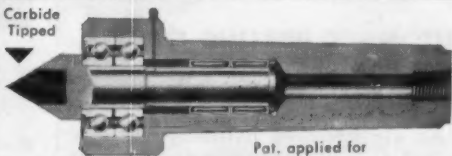
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

For more data circle 512 on Reader Service Card

MORE OF EVERYTHING BUT WEAR . . . with Carbide Tipped CROSS* Live Centers

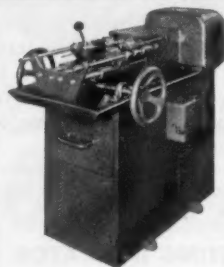
Prove to yourself carbide-tipped Cross Live Centers maintain precision output longer, on tough continuous run work—afford 2 to 3 times greater load capacity and outlive, as well as outperform, others. Test one! Available in Nos. 1, 2, 3, 4 and 5 Morse Taper, or straight shanks, other shanks to order. No. 2 M.T., \$39.00. Money back guarantee. Supplied also with tool steel tip. Ask for folder. Write direct, if distributor cannot supply you.

Carbide
Tipped



HERBERT CROSS & SON, Bala-Cynwyd 1, Pa.
Est. 1910 *Makers of famous WEE Live Center.

For more data circle 513 on Reader Service Card



for rapid threading

OF SCREW BLANKS AND SIMILAR PARTS

The KENT 2-Spindle BOLT THREADER

Alternate feeding to two spindles. Continuous operation. Large output. Low costs. Change-overs made quickly. Minimum skill required. Write for illustrated literature.

The KENT MACHINE CO., Cuyahoga Falls, Ohio

Drillers • Threaders • Slotters • Countersinkers • Bar Painters

For more data circle 514 on Reader Service Card

HOW ARE YOU FIXED FOR BOXES?

Finding a place for production parts can be inconvenient and time consuming when boxes are unavailable.

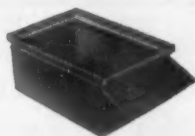


For the best steel stacking box, its Sterling—its top rim construction makes it best.

Sterling makes all types and sizes of steel boxes.

**STERLING
FACTORY EQUIP. CO.**

183 Charles St.,
Providence, R. I.



Sterling

Quality Handling & Storage Equipment



For more data circle 515 on Reader Service Card

new shop equipment . . .

AUTOMATIC DRILLING UNIT HAS 600 TO 4,000 R.P.M. SPINDLE SPEEDS

An air actuated, hydraulically controlled 1/2 h.p. automatic drilling unit, designated as the Model 603, has been announced by The Electro-Mechano Co., 265 E. Erie St., Milwaukee 2,



Electro-Mechano Automatic Drilling Unit

Wis. It is said to provide rapid advance, controlled feed through the work and rapid retraction. A self-contained standard induction type motor and adjustable sheaves provide a spindle speed range of 600 to 4,000 r.p.m. Stroke length is 4 inches. This unit is available with 1/2 inch chuck spindle or No. 2 Morse taper spindle. The motor is either single or three phase.

For more data circle 120 on Reader Service Card

★ ★ ★

MICRO ADJUSTING INDICATOR HOLDER

Oslund Precision Products, 14 Si-
gourney St., Hartford 5, Conn., has in-



MASTER GRIPPING CLAWS System Hubner

WHY use them?
1. Clamping action Ver-
tical as well as Hor-
izontal—pressing work-
piece down directly on
the machine table. No hammering and still no air
between. 2. Gain more working room. 3. Faster
and more secure setups. Easier to handle. 4. Un-
limited jaw opening. 5. No straps overlapping on
the workpiece; more machining surface. 6. Ex-
tremely versatile—take light cuts or heavy cuts,
use on small machines or heaviest production ma-
chines.

Exclusive Agents

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

**NEISE
MODERNTOLS**

For more data circle 516 on Reader Service Card

GET A BETTER "SURFACE GRINDER" JOB AT LESS COST! QUICKEST AND EASIEST SETTING TOOLS ON THE MARKET

RADIUS DRESSER \$44.00

ANGLE DRESSER \$49.00



Diamond \$7.00

ORDER DIRECT
on our 10 day
money back
guarantee



Diamond \$7.00

Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear.
Diamond always perfectly centered.
Easily set adjustable 180° stops.

10" Wheel size for DoALL and NORTON
Grinders—\$49.00. Diamond \$7.00.

SPECIAL 20" Wheel Size \$110.00.

Ball Thrust Bearing.

24 Precision Ground Surfaces. Can be set
very accurately with a Protractor or
Sine Bar. Works underneath the wheel.
Large bearing surfaces.

The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2199 E. 21st ST. • BROOKLYN 29, N. Y.

For more data circle 517 on Reader Service Card

Hammond
OF KALAMAZOO

Model
"400"



**HORIZONTAL
or VERTICAL**

**4"
ABRASIVE
BELT GRINDER**

Eliminate costly hand filing, grinding, deburring and many other operations . . . There are "101" applications for the 400 in your plant. Write for bulletin.

Hammond Machinery Builders

1815 DOUGLAS AVENUE

KALAMAZOO 54 MICHIGAN

For more data circle 518 on Reader Service Card

**6" Universal
Dividing Head**



with

DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

Write for Folder

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave.

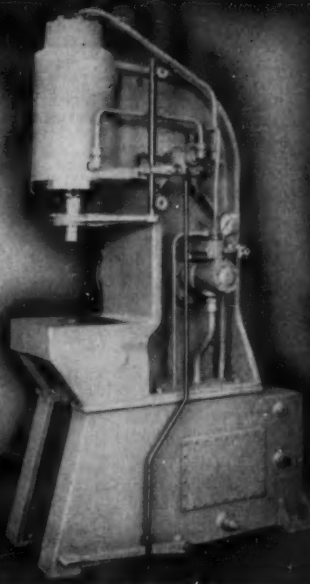
Cincinnati, Ohio

For more data circle 519 on Reader Service Card

Greenerd
HYDRAULIC PRESSES

- for**
- ASSEMBLING
 - BROACHING
 - FORMING
 - MOLDING
 - STRAIGHTENING

Hydraulic presses made to conform to J.I.C. standards. Pictured at right is 15-ton hydraulic press.
Write for Catalog 554.



GREENERD ARBOR PRESSES

NASHUA

EST. 1883

NEW HAMPSHIRE

For more data circle 520 on Reader Service Card

new shop equipment . . .

roduced the Oslund Holder, which is said to save a great amount of set-up time. It is equipped with two thumb screws, one of which is a lock screw. You loosen this screw, move clamp until indicator is in approximate position, then tighten. For final adjustment, simply turn the second screw—

JACO LOW COST
AUTOMATIC

STOCK REEL
COSTS NO MORE THAN
STANDARD STOCK REELS

POWERED BY
THE NATURAL
SPRING OF
UNCOILING STOCK



3 SIZES — ALL WILL TAKE 6" WIDE STOCK.

24" diameter **\$85.00**

30" diameter **\$89.00**

36" diameter **\$95.00**

Guaranteed — money back if not 100% satisfied

New LOW prices
on the JACO
3-inch and 6-inch
SCRAP CHOPPER



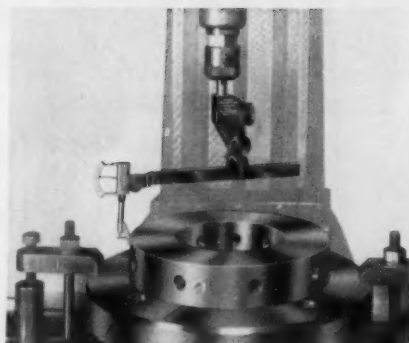
WRITE FOR FULL
DETAILS TODAY!

Dealer Inquiries Invited

JACO DEVICES, INC.

98 HIGH STREET • HINGHAM, MASS.

For more data circle 521 on Reader Service Card



Oslund Micro Adjusting Indicator Holder

the Micro Adjusting Screw—until indicator pointer reaches desired position.

The Oslund Holder can be used in three positions. First, with the holder set in normal position, it will indicate from dead center to approximately 2 inch diameter. Second, by a simple turn of the holder swivel clamp you can indicate up to 5 inch diameter. Third, by use of extension bar you can indicate up to 15 inch diameter.

For more data circle 121 on Reader Service Card

CENTERLESS GRINDING

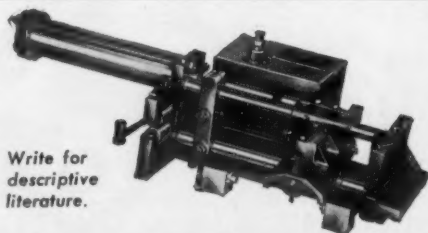
Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.

For more data circle 522 on Reader Service Card

COOPER WEYMOUTH OPEN THROAT AIR OPERATED SLIDE FEED For Power Press Operation

Operates on standard shop air lines. Easy to set up and adjust, holds to extreme accuracy. Made in five sizes. Feeds lengths to 36", up to 18" wide on mechanical and hydraulic presses.

COOPER WEYMOUTH, INC., 277 Noble Ave., Bridgeport 8, Conn.



Write for
descriptive
literature.

For more data circle 523 on Reader Service Card

KEEP PRODUCTION
HUMMING with
VIMCO *Light*
INSTANT ADJUSTABILITY




Wide range swivel casts
soft light over a 340° arc.

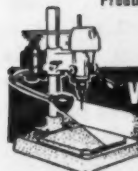
Steel wrapped flexible arm
moves easily . . . stays
rigidly in any position . . .
protects wiring.

The Vimco secret to soft, comfortable
light that keeps operators working
efficiently all shift long . . . is superb
adjustability. Vimcolights move easily to
any position the operator desires . . . no
bolts or screws to loosen, then reset.
This means Vimcolights are never over-
intense or under-intense, but can be
immediately set to give light that's just
right. Keep production humming round
the clock . . . install Vimcolights on your
machines.

Machine Builders: Write for "DEM
Bulletin"

Production Men: Request "Bulletin 85"

Vimcolights are  listed



VIMCO MFG. CO., INC.
Since 1919

111 Brayton Street, Buffalo, N. Y.

For more data circle 524 on Reader Service Card
June, 1956

5
Reasons


for replacing the
Spindle on your


#5 BROWN & SHARPE


SURFACE GRINDER


with a
Whitnon




 Self adjusting . . .
Powerful springs
keep the bearings
and shaft chatter-
free regardless of
wear or tempera-
ture change.

 Grease lubricated. No oil of any kind
required. Bearings and spindle are
grease packed and sealed at assembly.

 Fine finishes are assured . . . The
spindle assembly is precision balanced
on its own bearings. These ball bear-
ings are the most accurate obtainable.

 Completely interchangeable . . . This
unit replaces the old bearing assembly
on your present grinder.

 Use your original pulley and wheel
mount . . . No need to buy special
attachments.

Write Today for Price and Delivery

The Whitnon
MANUFACTURING CO.

Route 6 and New Britain Ave.,
Farmington, Conn.

For more data circle 525 on Reader Service Card
modern machine shop 309

new shop equipment . . .

ALL-PURPOSE HEAVY DUTY BALANCER FOR WIDE RANGE OF ROTATING PARTS

A new heavy duty Dy-Namic balancing machine has been announced by Bear Manufacturing Co., Rock Island, Ill. Called the No. 3301 "All-

Purpose" Model, this balancing machine handles single and dual motor truck and aircraft wheels, crankshafts, clutches, armatures, flywheels, impellers and blower wheels.

The machine gets its "All-Purpose" designation from the fact that it balances a wide range of rotating parts weighing from 25 to 1,000 pounds, and measuring up to 60 inches in diameter. Actually, its capacity is over 50 per

cent greater than that of other Dy-Namic Balancers in the Bear Manufacturing Company line.

The Model 3301 Dy-Namic Balancing Machine is available with a 2-h.p. vari-drive unit, which delivers spindle speeds of approximately 275 to 1,900 r.p.m. The vari-drive is especially desirable for balancing armatures, rotors, pump impellers, flywheels, clutches and similar elements. The manufacturer claims that this unit makes it possible to balance and test a 7.50 x 14 aircraft nose wheel assembly rotated at a speed that is equivalent to 160 miles per hour.

The basic model includes equip-

LUBRICATION ECONOMY

"NO SHUT-DOWNS WITH LUBRIPLATE!"

say HENRY & WRIGHT

"... a machine on extra heavy work was lubricated every eight minutes with a conventional grease. It had to be shut down to cool bearings after each coil run. Now with LUBRIPLATE twice a day, it operates continuously except for coil changes."

1. LUBRIPLATE reduces friction and wear.
2. LUBRIPLATE prevents rust and corrosion.
3. LUBRIPLATE is economical to use.

Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N.J.—Toledo 5, Ohio

*The Different
LUBRICANT!*



DEALERS EVERYWHERE, consult your Classified Telephone Book

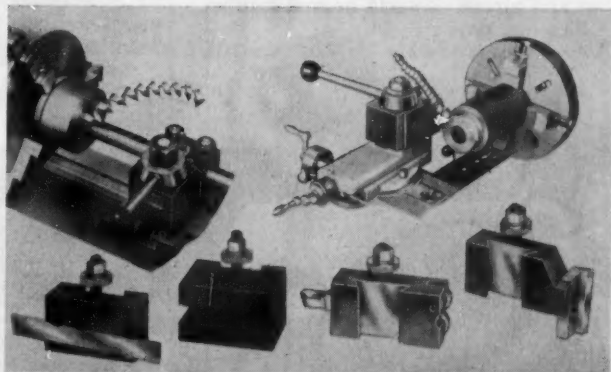
For more data circle 526 on Reader Service Card

GET THE MAXIMUM FROM YOUR LATHES by using the **ALORIS** "Quick Change" PATENTED **TOOL POST and HOLDERS**

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
- RUGGED CONSTRUCTION.
- TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS.
- GREATER RIGIDITY.
- SAVES 90% IN SET-UP TIME.
- UNCONDITIONALLY GUARANTEED.

Write for catalog and price list.

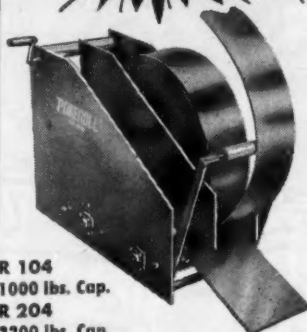


ALORIS TOOL CO., INC.

131-37 SANFORD AVENUE
FLUSHING-55, N. Y.

For more data circle 527 on Reader Service Card

30%
40%



R 104
1000 lbs. Cap.
R 204
2200 lbs. Cap.

POWEROLL

**NEW MEDELTON AUTOMATIC COIL CRADLE
SAVES LABOR! SAVES MONEY!**
DESIGNED FOR GREATER EFFICIENCY AND
SAFETY IN HANDLING COIL STOCK

- Roll on your coil and it's ready to go.
- Screw operated separator plate.
- No lifting, no pull, no accidents.
- Slack loop permits faster feeding.
- No drag on feed or dies. Eliminates pull, operator fatigue and spoilage.
- Can now be equipped with Pinch Roll attachment.

Phone or write for new folder • Dealer inquiries invited.

WM. HALPERN & CO., Inc.

MACHINE TOOLS

100 STEVENS AVE., MOUNT VERNON, N. Y.

For more data circle 528 on Reader Service Card

new shop equipment . . .

ment for handling single and dual truck wheels. Optional equipment may be obtained for balancing passenger car and aircraft wheels, as well as miscellaneous parts.

For more data circle 122 on Reader Service Card

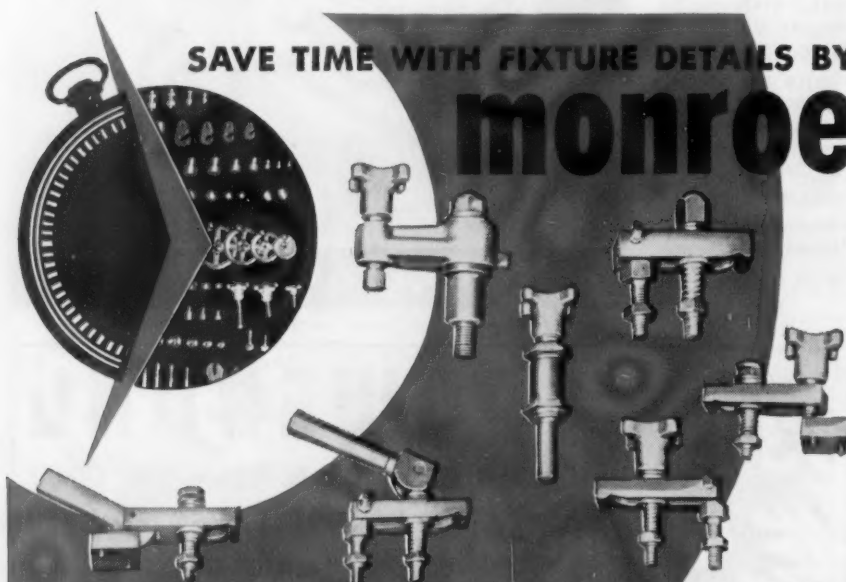
CORRECTION

Minute adjustments on the new Dekabore Boring Bar, developed by the Precision Tool and Manufacturing Company of Illinois, 1305 S. Laramie Ave., Cicero 50, Ill., are made by loosening three (3) screws and not eight, as stated on Page 316 of the May issue.



SAVE TIME WITH FIXTURE DETAILS BY

monroe



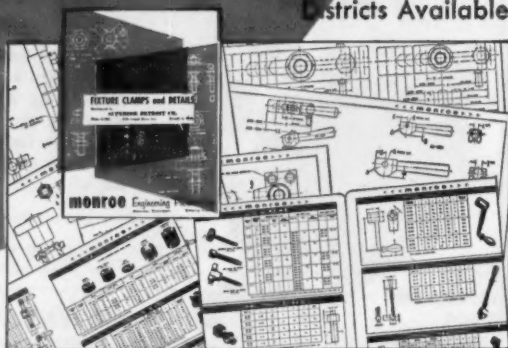
Districts Available

- ▶ OVER 1,000 DETAILS
- ▶ SUPERIOR QUALITY
- ▶ IMMEDIATE DELIVERY

Fully illustrated Catalog offers you accurate full size templates of assemblies.

WRITE TODAY TO monroe

Engineering Products, Inc.
Monroe Michigan



For more data circle 529 on Reader Service Card

NEW IMPROVED TAPER ATTACHMENT
For Lathes, Grinders and Milling Machines



This new indispensable taper attachment is the most versatile unit of its kind. It can be used on any machine for any kind of off-center setup. No need to disturb cross-carriage or tailstock. The operator simply replaces the tailstock center with this new improved TAPER-TAIL unit. The Micro-screw adjustment and positive locking device insure accurate tapers up to 3 inch the full length between centers. Straight work can be immediately resumed by reinserting the original center. TAPER-TAIL's unique carbide ball tip provides perfect spherical contact at any angle, gives extremely long life at high speeds. It is precision made of all steel construction, hardened at all critical points of wear, and fully guaranteed. These new units are now graduated on *TWO* edges, so that graduations can be read in any position.

L. A. FITZER TOOL WORKS
331 E. Park Blvd. Villa Park, Ill.

For more data circle 530 on Reader Service Card

**Save
80%**

**Machine
Moving
Time**



MIGHTY MOVER
heavy duty dolly

- Load capacity to 100,000 lbs.
- Top plate swivels, 360° directional control
- Nothing to wear out—nothing to maintain
- Two 4-inch roller bearing cast iron dollies

MIGHTY MOVER CO.

1478 S. Milwaukee St. • Denver 10, Colorado

For more data circle 531 on Reader Service Card

June, 1956

PRECISION DRILLING MACHINE

**5/8"
CAPACITY**

*Designed
for
Those Jobs
Where
Accuracy
Is
Important.*



FEATURES—

- Precision ball bearing spindle with minimum run out
- Accurate mounting of head and column to insure squareness of spindle to table
- Built-in gear drive for extra low speeds
- Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart
- Quick-set vernier depth control
- Heavy construction to maintain accuracy
- Available in bench or floor models. (Floor model illustrated)

Write for More Descriptive Bulletin

The ELECTRO-MECHANO Co.

265 East Erie Street • Milwaukee 2, Wis.

For more data circle 532 on Reader Service Card

modern machine shop 313



Press Time Brief

In the short space of just one year's time, Brown & Sharpe has announced to the trade some 178 individual new industrial product items, ranging from small but important aids to the mechanic, up to complete lines such as a granite surface plate line and a new line of dial indicator gages.

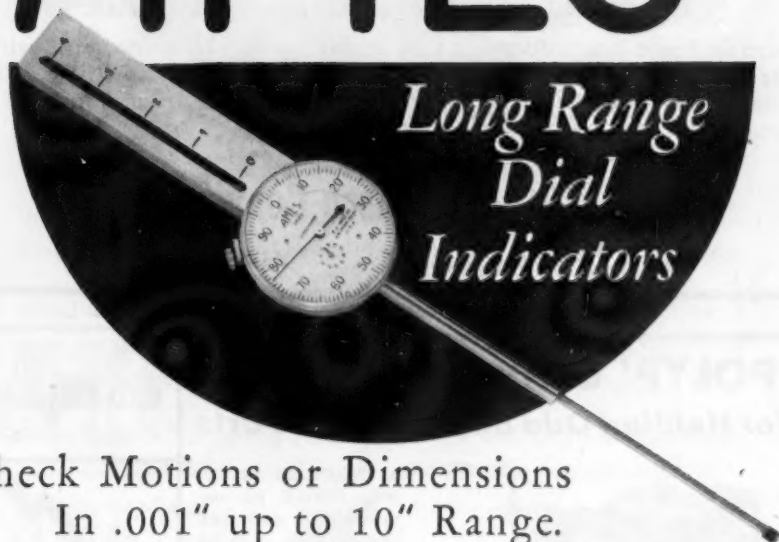
The establishment in Providence of Precision Center, a unique institution in the metalworking field, marks an important era of cooperation between the Brown & Sharpe Manufacturing Company, an important group of front line dealers, and untold customer users. Precision Center features four complete sections as follows: Screw Machine, Industrial Products, Grinding Machine, and Milling Machine.

PRECISION CENTER

Illustrated below is a view of the new Brown & Sharpe display designated as Precision Center which was formally dedicated at the Providence, Rhode Island, plant last month. Precision Center provides a meeting place for manufacturers to observe, discuss and study the application of the many available types and sizes of Brown & Sharpe machine tools and industrial products.



AMES



Check Motions or Dimensions In .001" up to 10" Range.

With Ames Long Range Dial Indicator models you can measure in .001", long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel of up to 10". Also they have all the advantages built into Ames regular indicators:—large diameter dials, widely spaced dial graduations; movable dials; replaceable contacts, count hands to indicate revolutions of the indicator hand.

Send your problem in long range measuring, Ames will be glad to suggest a solution.

Representatives in principal cities



B.C. AMES CO.

29 Ames Street, Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

For more data circle 533 on Reader Service Card

June, 1956

modern machine shop 315

63 JOBS YOU CAN DO BETTER WITH CERRO ALLOYS

THE unusual properties of Cerro non-shrinking, low-temperature-melting alloys are especially valuable in four groups of industrial applications:

1. **DESIGN**—in anchoring non-moving parts in machinery, and similar tasks.
2. **PATTERN** and **MODEL** reproduction.
3. **PUNCH** and **DIE PART** anchorage.
4. **HOLDING** work pieces of thin or irregular section.

Cerro de Pasco has prepared a new folder listing 63 important industrial jobs in these groups, that can be done better with Cerro Alloys. This folder tells how you can obtain detailed information on any or all of these useful and cost-saving applications.

Send today for our new free folder: "63 Jobs You Can Do Better with Cerro Alloys."



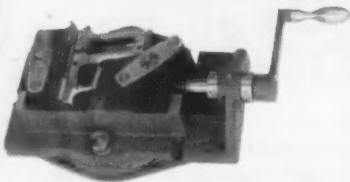
CERRO DE PASCO CORPORATION

304 Park Avenue,

New York 22, N. Y.

For more data circle 534 on Reader Service Card

'POLYP' UNIVERSAL CLAMP for Holding Odd and Irregular Parts



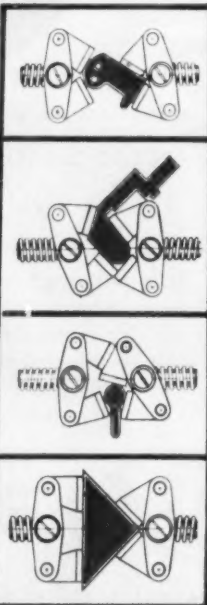
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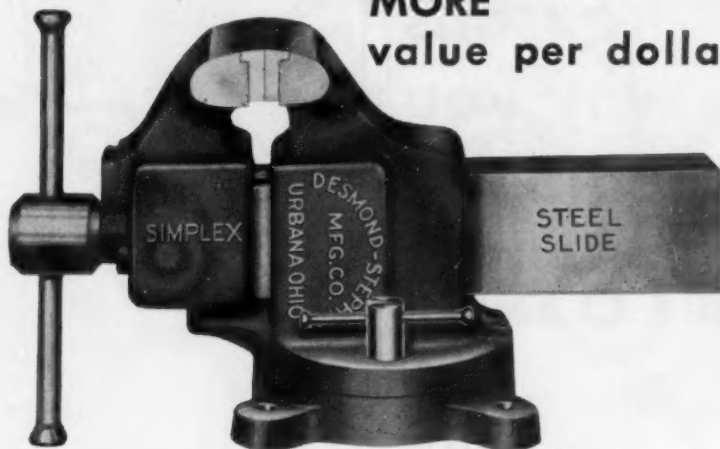
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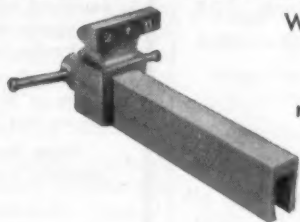
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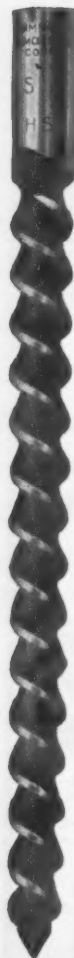
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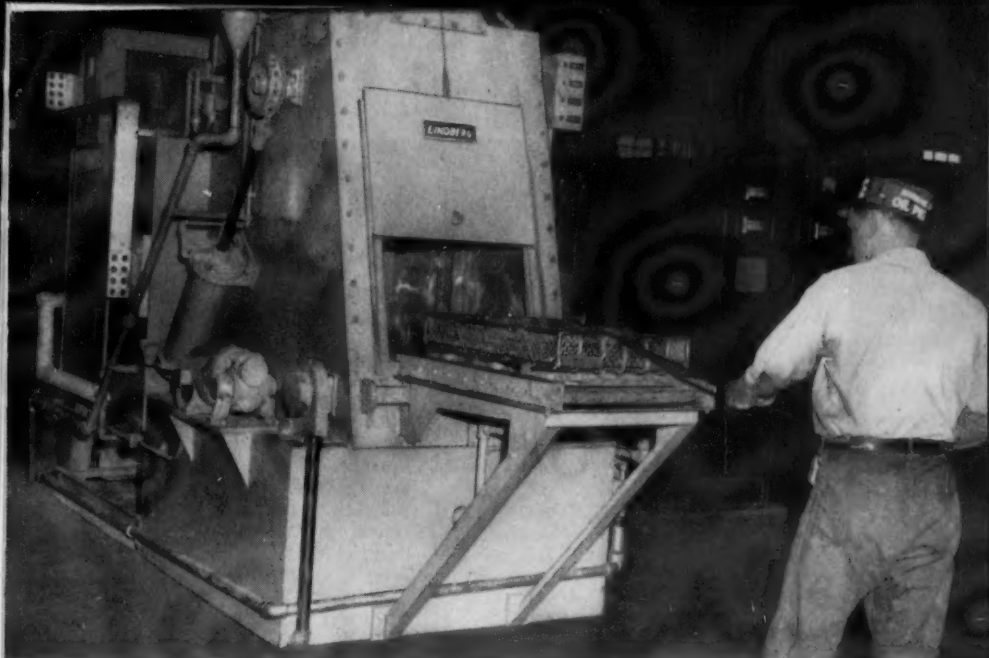
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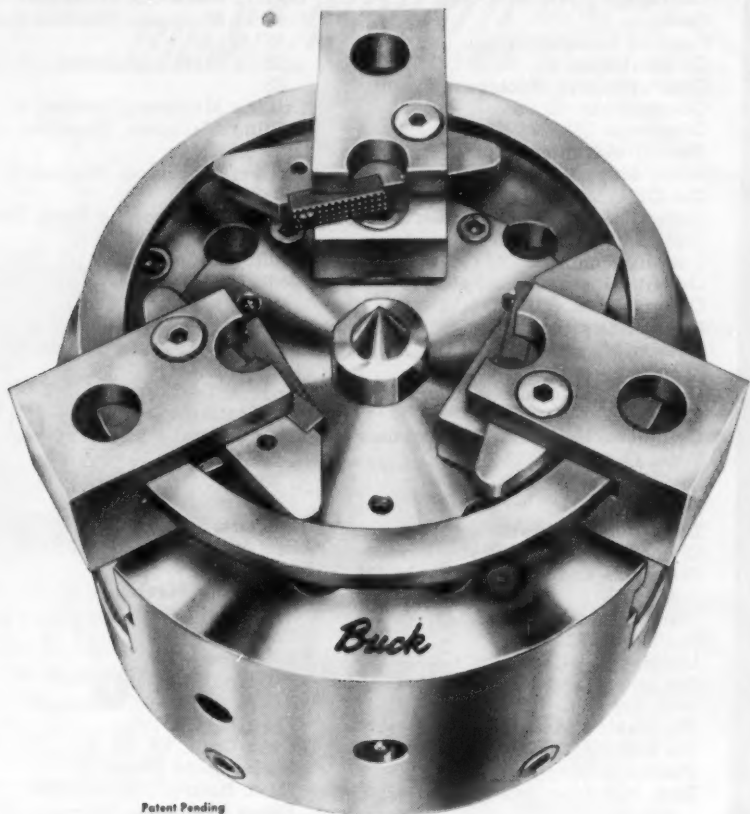
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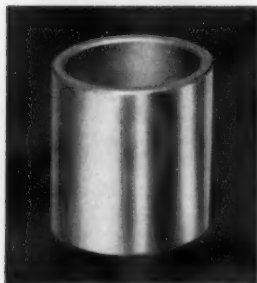
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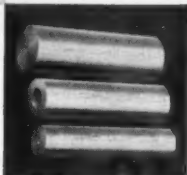
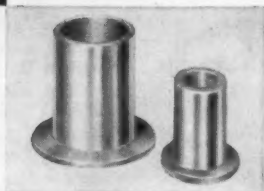


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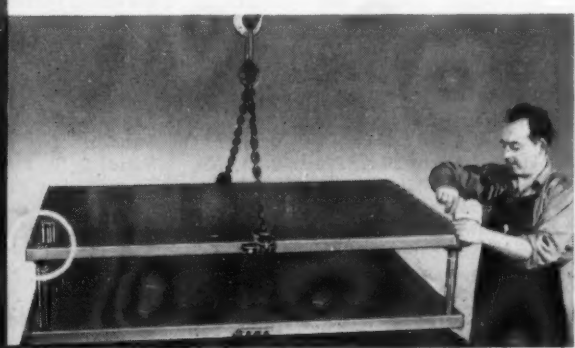
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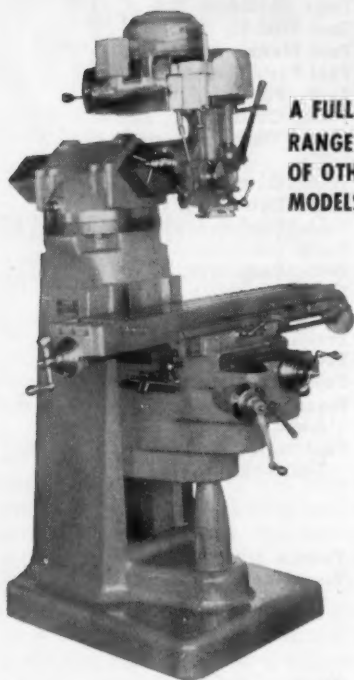
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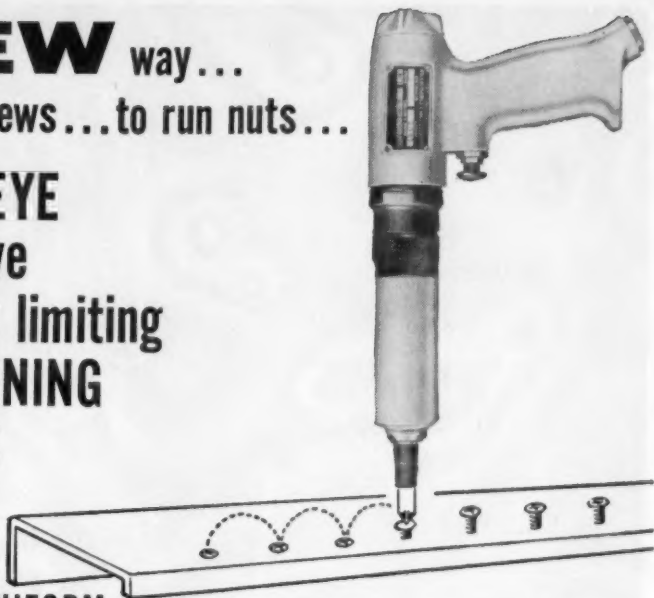
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**MAINTAIN UNIFORM
TIGHTNESS**—adjusts to any torque from 5 to 85 in./lbs.

Set the torque—just once—at any point between 5 and 85 in./lbs., and this Buckeye Torque Limiting Fastening Tool is ready to go! Apply the tool to the work—it sets itself for driving—AUTOMATICALLY... and it stays set even if you vary the pressure on the tool. The instant the screw or nut hits home, and that preset torque is reached, the tool clutch disengages — AUTOMATICALLY, even if the operator maintains pressure on the tool. Now, remove the tool from the work and it will re-set

itself—AUTOMATICALLY.

Simple. Foolproof. Every fastener is just as tight as the one before. The workpiece doesn't get scratched or damaged. The fasteners won't strip or shear. And your bits and sockets will last longer, too.

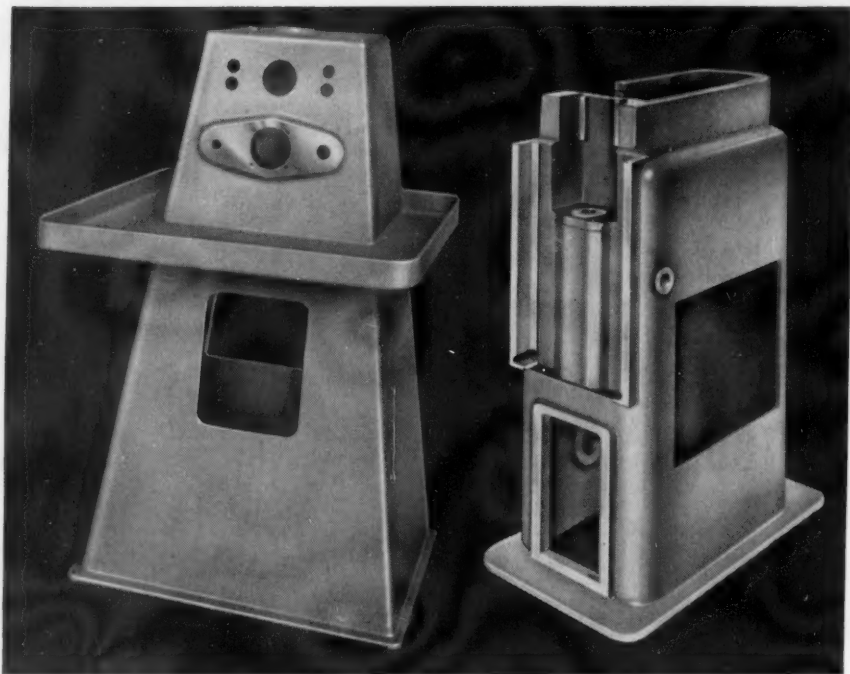
If you aren't doing your fastening work this NEW way, with a Buckeye Torque Limiting Fastening Tool, better write—NOW—for complete information. Better still, why not ask for an in-plant demonstration—there's no obligation.

Buckeye Tools
CORPORATION

DIVISION 17 • DAYTON 1, OHIO

producers of
the world's first
successful
rotary air tools

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LITTLEFORD complete fabricating

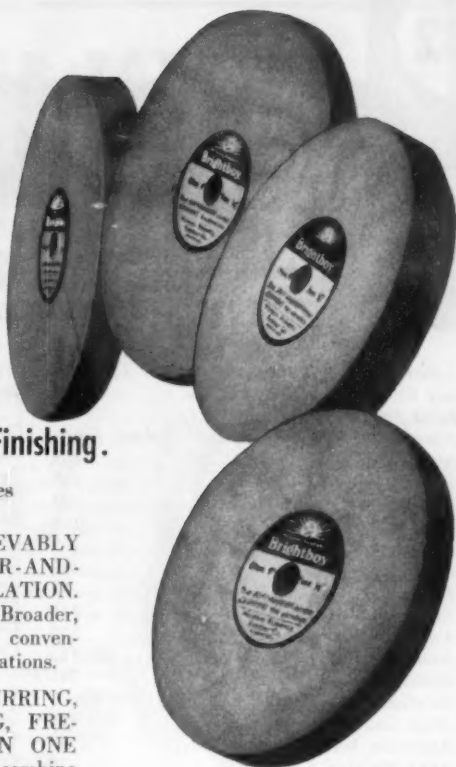
layout
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Littleford's complete fabricating facilities free your plant and equipment for your own manufacturing specialty. It's like finding a new building—with 175,000 sq. ft. of floor space, equipped for all kinds of metal fabricating. You'll welcome this additional capacity that'll keep your assembly lines rolling. And you'll profit from Littleford's experience, particularly in fabricating machine bases, guards and pans. Why not send us your blueprints today for prompt and accurate estimates? Littleford Bros., Inc., 433 E. Pearl St., Cincinnati 2, Ohio.

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NEW WHEELS...

With NEW, MULTI-USE
ABRASIVES APPLICATIONS



A Completely New Concept In Finishing.

Replacing Costlier, Slower Procedures

THE WORKING ACTION OF UNBELIEVABLY VERSATILE BRIGHTBOY RUBBER-AND-ABRASIVE TEXTURES IS A REVELATION. Nothing like you have ever seen before. Broader, completely beyond anything within the conventionally-accepted range of abrasive applications.

SIMULTANEOUS, TIME-SAVING BURRING, CLEANING, FINISHING, POLISHING, FREQUENTLY CAN BE ACHIEVED IN ONE OPERATION. With Brightboy you can combine operations, replace slower, costlier methods.



There is a readily available, stock Brightboy grain and texture "job-matched" for whatever your regular and special applications demand, and you can use it for many kinds of jobs. You have a wide choice of Silicon Carbide and Aluminum Oxide grains, each in combinations of grain sizes and textures from extra fine to extra coarse, in soft, firm and tough rubber binders.

Ask your dealer to recommend the Brightboy grain and texture best suited to your jobs—and how Brightboy can be applied in *new work* under consideration. Ask him for the Brightboy Catalog listing applications, machine speeds, work suggestions. Write us if he cannot supply you, or on any problem in which finishing is involved.

**BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th St., Newark 7, N. J.**

America's Pioneer Manufacturer of Rubber-Bonded Abrasives



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**Built-in features and operating advantages
increase production—reduce costs!**

Any way you look at it—you save and gain with Procunier Tappers. It is an uncontested fact, when you use Procunier you are enjoying the advantages of the finest tapping heads. Countless reports indicate tremendous savings on taps, automatic production increases, drastic reduction in parts spoilage, less operator fatigue, fewer "down hours" and precision accuracy in threads and tapped holes. Taking these gains and savings into consideration you can quickly see why Procunier heads "pay for themselves in just a short time!"

Procunier heads offer high speed, quiet operation, a new, powerful drive—with finger tip pressure; economical lightness, "long life" ruggedness and an accuracy and dependability you can consistently count upon! And, there's a versatile model for practically every tapping operation.

Send for FREE Brochure

Find out how you, too, can benefit with Procunier. Get the full construction details—see the many unusual tapping applications—get the "inside story" on why Procunier has led the field for more than 30 years. Write today—now.



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Safety Chuck Co.

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Dept. 6**

Chicago 6, Illinois

**PROCUNIER SAFETY CHUCK CO.,
12 S. Clinton St., Chicago 6, Ill. Dept. 6**

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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features—The first radials to offer flame-hardened 9" and 11" columns. Centralized controls, quick response, maximum work visibility cut machine-handling time. Alloy steel spindle quill has a long bearing in the head. Spindle is mounted on 5 precision ball bearings. Hardened tang slot, safety elevating nut and screw. A wide variety of bases can be furnished, or the Gilbert can be mounted on runways or rails.

new 3 hp radial

Automatic spindle reverse, adjustable spring counterbalance.

Arm length: 3' or 4'.

Column diameter: 9".

Spindle radius from column center, max.: 42 $\frac{3}{4}$ ", 54 $\frac{3}{4}$ ".

Spindle traverse in head: 10".

Morse taper in spindle: #4.

12 spindle speeds to 3200 rpm.

5-7 $\frac{1}{2}$ hp radial

Arm length: 3', 4', or 5'.

Column diameter: 9" or 11".

Spindle traverse in head: 12"

Morse taper in spindle: #4 or #5.

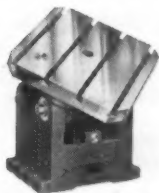
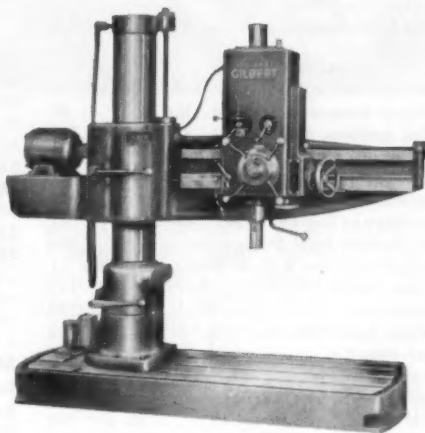
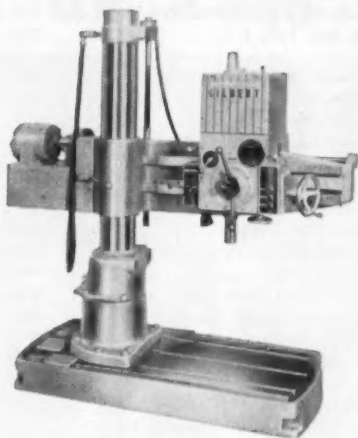
12 spindle speeds to 1800 rpm.

Spindle radius from column center, max.: 44 $\frac{1}{2}$ ", 56 $\frac{1}{2}$ ", 68 $\frac{1}{2}$ ".

universal table—For use with either radial drills or horizontal boring mills, Gilbert universal tables permit machining 5 sides of a cube at one setting of the work piece. Sizes: 22"x22" and 27"x27" tops.

These machines may be purchased under our new low-cost financing plan: 6% simple interest (3% add on), up to 5 years to pay.

write for new literature



those who buy Gilbert buy **GILBERT** *again*

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3366 Beekman St., Cincinnati 23, Ohio

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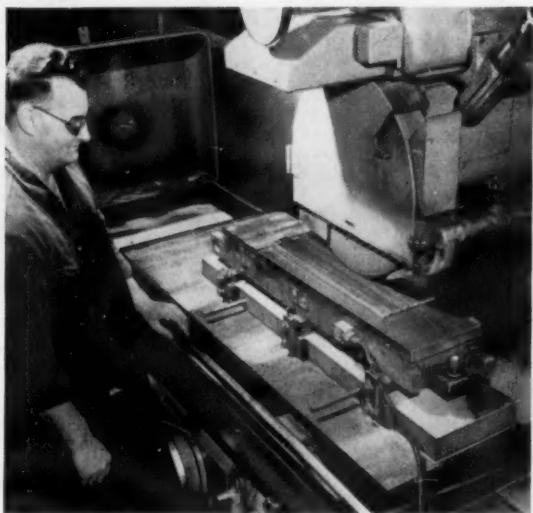
PRODUCTION UP 25%

with
ELECTRO-MAGNETIC
Magna-Lock
CHUCK



Magna-Lock chuck holds six tapered gibs during roughing operation.

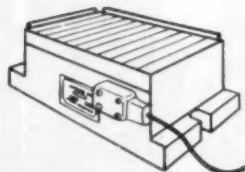
Magna-Lock chuck holds gib during finish grinding.



Solve your holding problems with Magna-Lock. For complete information, WRITE TODAY, Dept. MM-66.

At GISHOLT MACHINE COMPANY 24" tapered gibs are held by a Magna-Lock chuck during rough surface grinding and finishing. Pieces are rough-ground six at a time, finish-ground singly. Stock removal, .020" to .025". Spindle speed, 1200 r.p.m., table speed, 100 f.p.m. No fixture set-up time is required with the Magna-Lock chuck. There are no rejects, no scrap—production is up 25%.

This is an example of how Magna-Lock's *extra holding power* increases productivity, cuts costs.



Hanchett MAGNA-LOCK
CORPORATION

BIG RAPIDS, MICHIGAN, U. S. A.

designers and makers of a complete line of magnetic chucks and devices.

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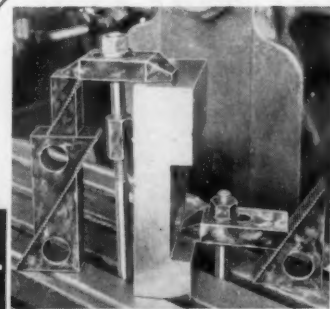


T-NUT & STUD SETS—12 SIZES
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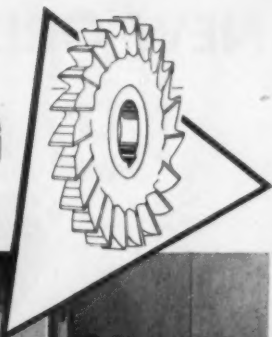
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119 HOLLIER AVE., DAYTON 3, OHIO



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SENTRY ELIMINATES GRINDING AFTER HARDENING



A recent national survey of high speed steel tool manufacturers (making items similar to the milling cutter shown above) indicates that much time is wasted in grinding tools after hardening.

Many furnaces do not maintain adequate richness of atmosphere at high speed steel hardening temperatures. This necessitates subsequent grinding and finishing operations.

With Sentry furnace equipment employing the positive Sentry Diamond

Block atmosphere, tools may be soaked to assure maximum hardness characteristics and come from the high heat absolutely free from scale or decarburization. Sharp cutting edges are faithfully maintained and little or no finishing operations are required.

You too can save with Sentry quality controlled hardening on all grades of high speed and high carbon, high chrome steel. Consult Sentry for a demonstration on samples of your own tools.



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Catalog
R-17

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NEW GREASE

improves



Hisey PRECISION GRINDERS

After thorough tests a new type grease has been adopted for HISEY Precision Grinders. The Internal and External Spindles have been redesigned for grease instead of the oil mist which we used for so many years.

Some of the resulting advantages are:

- Spindle can be operated at any angle and in any position.
- Bearings need no further lubrication for 5000 hours.
- Spindles operate at lower temperatures.
- Fewer parts are required in new design and seals are more effective.

ASK FOR CATALOG 72 SA



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Snagging Grinders; Wet Tool Grinders; Disc Grinders;
Drill Grinders and Dust Collectors.*

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June 1956 Issue

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shop**

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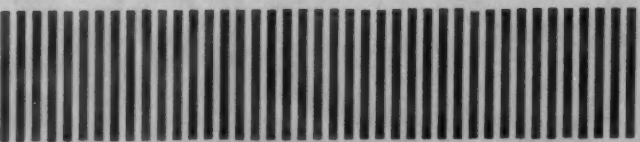
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